

NOTES ON NEOTROPICAL MALPIGHIACEAE—I

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My current studies of American Malpighiaceae include both monographic and floristic projects, as well as routine identification of many specimens sent as gifts. In the course of this work I regularly encounter taxa new to science, situations in need of nomenclatural adjustment, and material that supplements our previous knowledge, such as flowering material of a species hitherto known only in fruit. It will be many years before I can complete and publish revisions for large difficult genera like *Byrsonima* and *Heteropterys*. These notes will serve as a vehicle for the earlier publication of miscellaneous descriptions and other observations as they accumulate.

BYRSONIMA

The species treated below are presented in approximately the order in which I believe they would have appeared in Niedenzu's monograph of the family (1928). This is done in order to facilitate their comparison and integration with that treatment.

Byrsonima hatschbachii W. R. Anderson, sp. nov.

Fig. 1.

Suffrutex caulibus 23-40 cm altis plerumque non ramosis ex xylopodio enascentibus. Lamina foliorum majorum 11.5-16.5 cm longa, 1.4-1.6 cm lata, lineari-elliptica; petiolus 2-3 mm longus; stipulae 2-2.7 mm longae, basi connatae distaliter liberae. Inflorescentia bracteis bracteolisque persistentibus. Petala lutea; petalum posticum ungue eglanduloso. Antherae 2-2.5 mm longae, sparsim sericeae praecipue inter loculos, connectivo loculos \pm aequanti. Ovarium glabrum.

Compact subshrub, with stems 23-40 cm tall, finely sericeous to glabrate, unbranched or nearly so, all arising from a xylopodium. Lamina of the larger leaves 11.5-16.5 cm long, 1.4-1.6 cm wide, linear-elliptical, very gradually tapered to an acute or acuminate apex and attenuate base, thinly sericeous to glabrate, with the short white hairs longest persistent on the adaxial midrib, the lateral veins prominulous on both sides; petiole 2-3 mm long, not clearly distinguishable from the lamina, sericeous to glabrate; stipules 2-2.7 mm long, connate only in the proximal third, the free portions triangular or acuminate, abaxially sericeous, adaxially glabrous. Inflorescence 9-11 cm long, finely sericeous with the hairs brown to gray, the flowers borne 1 per bract or (especially proximally) in compact cincinni of 2-3 flowers; bracts 2-4 mm long, 0.6-1 mm wide, subulate or narrowly triangular, thinly sericeous to glabrate, stiff; primary floriferous peduncle (from bract to joint) 0-3 mm long, developed only at lower nodes; bracteoles like the bracts but shorter; bracts and bracteoles



FIG. 1. *Byrsonima hatschbachii* and *B. affinis*. a-f, *B. hatschbachii*: a) habit, $\times 0.5$; b) intrapetiolar stipules, adaxial view, $\times 4$; c) 2-flowered cincinnus, $\times 2.5$; d) posterior petal, $\times 3.5$; e) stamens, $\times 7.5$; f) gynoecium, with styles bending away from posterior petal, $\times 7.5$. g-l, *B. affinis*: g) flowering branch, $\times 0.5$, with abaxial lamina $\times 2.5$ in circle; h) stipules, $\times 1.5$; i) 2-flowered cincinnus, $\times 1.5$; j) stamens, $\times 5$; k) gynoecium, with styles bending away from posterior petal, $\times 5$; l) fruit, $\times 0.5$. Drawn by Karin Douthit, a-f from *Hatschbach 37593*, g-k from *Anderson 11274*, l from *Anderson 9518*.

persistent at least past flowering. Pedicel 4.5–6 mm long in flower, sericeous, circinate in bud, decurved in old flowers. Flower 12–13 mm in diameter. Sepals all biglandular, ca 1.5–2 mm long beyond the glands, 1.5 mm wide, obtuse, abaxially sericeous in center, ciliate on margin, adaxially glabrous, recurved at the apex in anthesis; glands 1–2.5 mm long. Petals yellow, glabrous; lateral petals reflexed, with the claw ca 2.5 mm long, the limb 4.5–5 mm long, 5–6 mm wide; posterior petal with the claw 2.5 mm long, erect, eglandular, the limb 4 mm long and wide, reflexed. Filaments 1.9 mm long, abaxially glabrous, adaxially hirsute at the base; anthers 2–2.5 mm long, sparsely sericeous, especially between the locules, the locules unwinged, often free at the apex, the connective not or hardly exceeding the locules. Ovary 1.3 mm high, glabrous, all 3 locules fertile; styles 3 mm long, distally slightly bent away from the posterior petal. Fruit unknown.

TYPE: BRAZIL. Mato Grosso: Mun. Chapada dos Guimarães, Capão Seco, campo cerrado, borda das depressões úmidas, 15 Nov 1975 fl, *Hatschbach 37593* (MBM, holotype; MICH, isotype).

Byrsonima hatschbachii is named in honor of Gert Hatschbach, a fine botanist whose “olho vivo” seldom misses a novel plant. The species seems to be most closely related to *B. intermedia* Adr. Juss., from which it differs in its short, nearly unbranched stems, long narrow leaves, nearly distinct stipules, and persistent bracts and bracteoles. *B. intermedia* is rather variable and as presently defined may well comprise more than one species. However, even in its broadest interpretation it could not accommodate *Hatschbach 37593*, nor have I seen any specimens intermediate between the two species.

Byrsonima morii W. R. Anderson, sp. nov.

Fig. 7.

Frutex 1.5–2 m altus. Lamina foliorum majorum (5–) 6–8.2 cm longa, (3–) 4–6.1 cm lata, late elliptica vel parum ovata obovatave vel fere orbicularis, coriacea, subtus pertinaciter sericea vel appresso-tomentosa vel glabrescens, reticulo plerumque stramineo et prominenti, praecipue in pagina adaxiali; petiolus (3–) 5–12 (–15) mm longus; stipulae (1.5–) 2–3 mm longae, omnino connatae. Inflorescentia (4–) 6–9 (–13) cm longa, floribus in dimidio distali congestis, bracteis bracteolisque demum deciduis. Petala lateralia alba, petalum posticum flavum. Antherae 2–2.9 mm longae, glabrae vel sparsim sericeae inter loculos, connectivo loculos \pm aequanti. Ovarium glabrum.

Shrub 1.5–2 m tall, the stems sericeous, the short hairs brown and persistent in the first season of growth, turning white and eventually deciduous in later seasons. Lamina of the larger leaves (5–) 6–8.2 cm long, (3–) 4–6.1 cm wide, broadly elliptical or slightly ovate or obovate to nearly orbicular, obtuse, rounded, or emarginate at the apex, slightly revolute at the margin, cuneate or truncate and shortly decurrent at the base, coriaceous, often glaucous above, sericeous or appressed-tomentose, persistently so or early or eventually glabrescent, the hairs above rather twisted and soon turning white, the hairs below nearly straight to serpentine or moderately twisted, reddish or sometimes eventually turning white, the lateral veins and reticulum usually yellowish and prominent, especially above; petiole (3–) 5–12 (–15) mm long, subsericeous to glabrescent; stipules (1.5–) 2–3 mm long, rounded, smoothly and completely connate, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence (4–) 6–9 (–13) cm long, with flowers mostly densely clustered in the distal half, subsericeous proximally to nearly velutinous distally, the flowers borne mostly 1 per bract, occasionally in 2-flowered cincinni; bracts 1.5–3 mm long, 0.7–1.4 mm wide, triangular, stiff or reflexed apically, abaxially hairy, adaxially glabrous; peduncle 0–1 (–3) mm long; bracteoles like the bracts but smaller; bracts and

bracteoles persistent through anthesis, mostly deciduous before maturation of the fruit. Pedicel 7–12 mm long (–15 mm in fruit), reddish-tomentose, circinate in bud, decurved and eventually twisted in fruit. Flower 12–15 mm in diameter. Sepals all biglandular, 1.5–2.5 mm long beyond the glands, 1.8–2.5 mm wide, obtuse or rounded at the apex, abaxially loosely but densely sericeous, adaxially glabrous or sparsely tomentose distally, appressed but recurved at the apex in anthesis, accrescent (to 2–3 times as large) in fruit; glands 2–3 mm long. Petals glabrous, the lateral 4 white, the posterior bright yellow turning red-orange in age; lateral petals strongly reflexed, with the claw 3–3.5 mm long, the limb 4.3–6.5 mm long, 5.5–8 mm wide; posterior petal erect, with the claw 3–3.5 mm long, the limb 3.5 mm long, 4 mm wide, corrugated. Filaments 2–2.5 mm long, abaxially glabrous, adaxially hirsute at the base; anthers 2–2.9 mm long, glabrous or with a few long straight hairs between the locules, the locules un-winged, sometimes free at the apex, the connective not or hardly exceeding the locules (up to 0.3 mm). Ovary 1.4–1.7 mm tall, glabrous, all 3 locules fertile; styles 3–4 mm long, straight or bent at the apex. Mature fruit not seen.

TYPE: BRAZIL. Bahia: Mun. Mucugê (=Mucujê), 3 km S de Mucujê, campo rupestre, 1000 m, 22 Dec 1979 fl, *Mori & Benton 13158* (CEPEC, holotype; MICH, isotype).

PARATYPES: BRAZIL: Bahia: 10–15 km N of Mucugê on road to Andaraí, sandstone hillside with shallow soils and large bluffs of exposed rock, 1100 m, Feb fl, *Harley 18864* (MICH); Mun. Mucujê, 3 km S de Mucujê, campo rupestre, 1000 m, Jul fl, *Mori et al. 12609* (MICH, US); Mun. Mucujê, 10–12 km NW de Mucujê, campo rupestre, 1000 m, Jul fl, *Mori et al. 12667* (MICH, US); Mun. Lençóis, 15 km NW of Lençóis, campo rupestre, 900 m, Jun fl, *Mori & Boom 14282* (MICH), Jun fr, *Mori & Boom 14283* (MICH); Mun. Lençóis, 5 km N of Lençóis, campo rupestre, Jun fl, *Mori & Boom 14402* (MICH).

When I first saw this species, I identified it (*Harley 18864*) as “*Byrsonima bumeliifolia* Adr. Juss. vel aff.” However, since seeing the type of *B. bumeliifolia* in Paris I have changed my opinion. That type has very dense, tightly twisted, persistent hairs on the abaxial side of the lamina, as in *B. variabilis* Adr. Juss., and it seems likely that those two species are closely related, perhaps even conspecific. *B. morii* is more probably related to *B. brachybotrya* Nied., a species of Paraná and Santa Catarina. They have similar flowers crowded in short pseudoracemes, although these are longer and bear more flowers in *B. morii*. *B. morii* has the lamina much larger, especially wider (two or three times as wide) and borne on a longer petiole. The two also differ dramatically in their habit. *B. morii* is a shrub 1.5–2 m tall, while *B. brachybotrya* is a subshrub with slender branches 15–50 cm high from a woody, more or less subterranean, base.

Byrsonima morii honors Scott A. Mori, a fine botanist whose collections from southern Bahia comprise a major contribution to our knowledge of that flora.

Byrsonima onishiana W. R. Anderson, sp. nov.

Fig. 2.

Suffrutex caulibus erectis usque ad 30 cm altis. Lamina foliorum majorum 10–17 cm longa, 1.5–3.5 cm lata, anguste oblonga vel obovata, apice acuta vel obtusa, basi attenuata; petiolus 5–12 mm longus; stipulae 2–3 mm longae, liberae vel usque ad $\frac{2}{3}$ connatae. Inflorescentia bracteis bracteolisque persistentibus. Petala pallide rosea. Antherae 2.1–2.7 mm longae, glabrae vel sparsim sericeae inter loculos, connectivo loculos \pm aequanti. Ovarium glabrum. Fructus 9–11 mm diametro.

Subshrub, the leafy stems erect, slender, up to 30 cm tall, arising from a thicker prostrate (?) underground (?) stem, loosely sericeous to glabrate. Lamina of the larger leaves 10–17 cm long, 1.5–3.5 cm wide, narrowly oblong or obo-



FIG. 2. *Byrsonima onishiana* and *B. spinensis*. a-f, *B. onishiana*: a) habit, including underground base, $\times 0.5$; b) stipules, $\times 3.5$; c) flower, $\times 2.5$; d) stamens, $\times 7.5$; e) gynoecium, with styles bending away from posterior petal, $\times 5$; f) fruit, drawn from behind to show enlarged sepals and persistent petals, $\times 2$. g-l, *B. spinensis*: g) flowering branch, $\times 0.5$; h) stipules, $\times 5$; i) cincinnus, $\times 2.5$; j) stamens, $\times 7.5$; k) gynoecium, $\times 5$; l) enlarging fruit, $\times 2.5$. Drawn by Karin Douthit, a-f from Irwin *et al.* 25824, g-l from Anderson *et al.* 35339.

vate, acute or obtuse at the apex, very gradually attenuate at the base, thinly appressed-tomentose to glabrescent, the lateral veins and reticulum prominent on both sides but more strongly so above; petiole 5–12 mm long, distinguishable only with difficulty from the decurrent lamina, appressed-tomentose to glabrate, swollen at the base; stipules 2–3 mm long, triangular or ovate, distinct or connate for up to $\frac{2}{3}$ of their length, abaxially loosely sericeous, adaxially glabrous. Inflorescence 3–13 cm long, loosely sericeous, the flowers borne 1 (–2) per bract; bracts 2–3 mm long (–8 mm at lowest flowers), 1–1.3 mm wide, narrowly triangular to subulate, stiff and ascending or spreading or somewhat recurved; peduncle none; bracteoles like the bracts but smaller; bracts and bracteoles persistent past maturity of the fruit. Pedicel 5–10 mm long or longer in fruit, loosely sericeous, circinate in bud, decurved and eventually twisted in fruit. Flower ca 14 mm in diameter. Sepals all biglandular, 1.5–2.5 mm long beyond the glands, 1.7–2.3 mm wide, obtuse at the apex, abaxially loosely sericeous, adaxially glabrous, recurved at the apex in anthesis, accrescent (to ca 3 times as large) in fruit; glands 1.7–2.3 mm long. Petals “very pale pink,” glabrous; lateral petals reflexed, with the claw 2–3 mm long, the limb 5–5.5 mm long, 5.5–7 mm wide; posterior petal erect, with the claw 2.5 mm long, the limb 3.7 mm long, 4.5 mm wide, corrugated. Filaments 2–2.5 mm long, abaxially glabrous, adaxially hirsute at the base; anthers 2.1–2.7 mm long, glabrous or with a few long, straight hairs on inner faces of locules, the locules unwinged, often free at the apex, the connective not or hardly exceeding the locules (up to 0.2 mm). Ovary 1.2–1.6 mm high, glabrous, all 3 locules fertile; styles 3.6–3.8 mm long, straight or bent away from posterior petal at apex. Fruit 9–11 mm in diameter, glabrous; petals sometimes persistent nearly to maturity of fruit.

TYPE: BRAZIL. Minas Gerais: Serra dos Óculos, campo, ca 60 km NE of Patrocínio, 1050 m, 1 Feb 1970 fl/fr, *Irwin et al. 25824* (UB, holotype; MICH, NY, isotypes).

PARATYPE: BRAZIL. Verusa (without further locality data), Oct fl, *Heringer 10701* (UB).

Byrsonima onishiana is named in honor of Eunice Onishi, Brazilian botanist and one of the collectors of the type. It is most closely related to *B. oxyphylla* Adr. Juss., which has a similar habit and generally similar flowers. In *B. oxyphylla* the leaves are smaller (seldom over 6 cm long and 1.5 cm wide) and more numerous on each stem; its inflorescence is shorter and more congested, often almost umbellate; its petals are white (the lateral four) and yellow (the posterior one, turning red in age); and the drupe is smaller, 5–6 mm in diameter.

Byrsonima cacaophila W. R. Anderson, sp. nov.

Fig. 3.

Arbor 10–20 m alta. Lamina foliorum majorum 13–24 cm longa, 5.5–10 cm lata, glabrata vel in costa pertinaciter sericea; petiolus 12–32 mm longus; stipulae 3.5–6.5 mm longae, omnino connatae vel distaliter distinctae. Inflorescentia cincinnis 1–3-floris, bracteis plerumque 3–5.5 mm longis, subulatis, reflexis, pedunculo primario (2–) 4–10 mm longo, bracteolis 1–2 mm longis, ovatis, bracteis bracteolisque persistentibus. Sepala adaxialiter glabra. Petala alba, aetate rubescentia. Antherae 2.2–2.9 mm longae, sericeae praecipue inter loculos pilis fusiformibus 0.4–0.5 mm longis, connectivo loculos \pm aequanti. Ovarium glabrum. Fructus (siccus) 11 mm longus, 15–18 mm diametro, depressus, nuce costata.

Tree 10–20 m tall, the trunk 25–35 cm in diameter, the stems sericeous, eventually glabrescent. Lamina of the larger leaves 13–24 cm long, 5.5–10 cm wide, acute or obtuse to rounded and often abruptly short-acuminate at the apex, slightly revolute at the margin, cuneate at the base, glabrate at maturity or

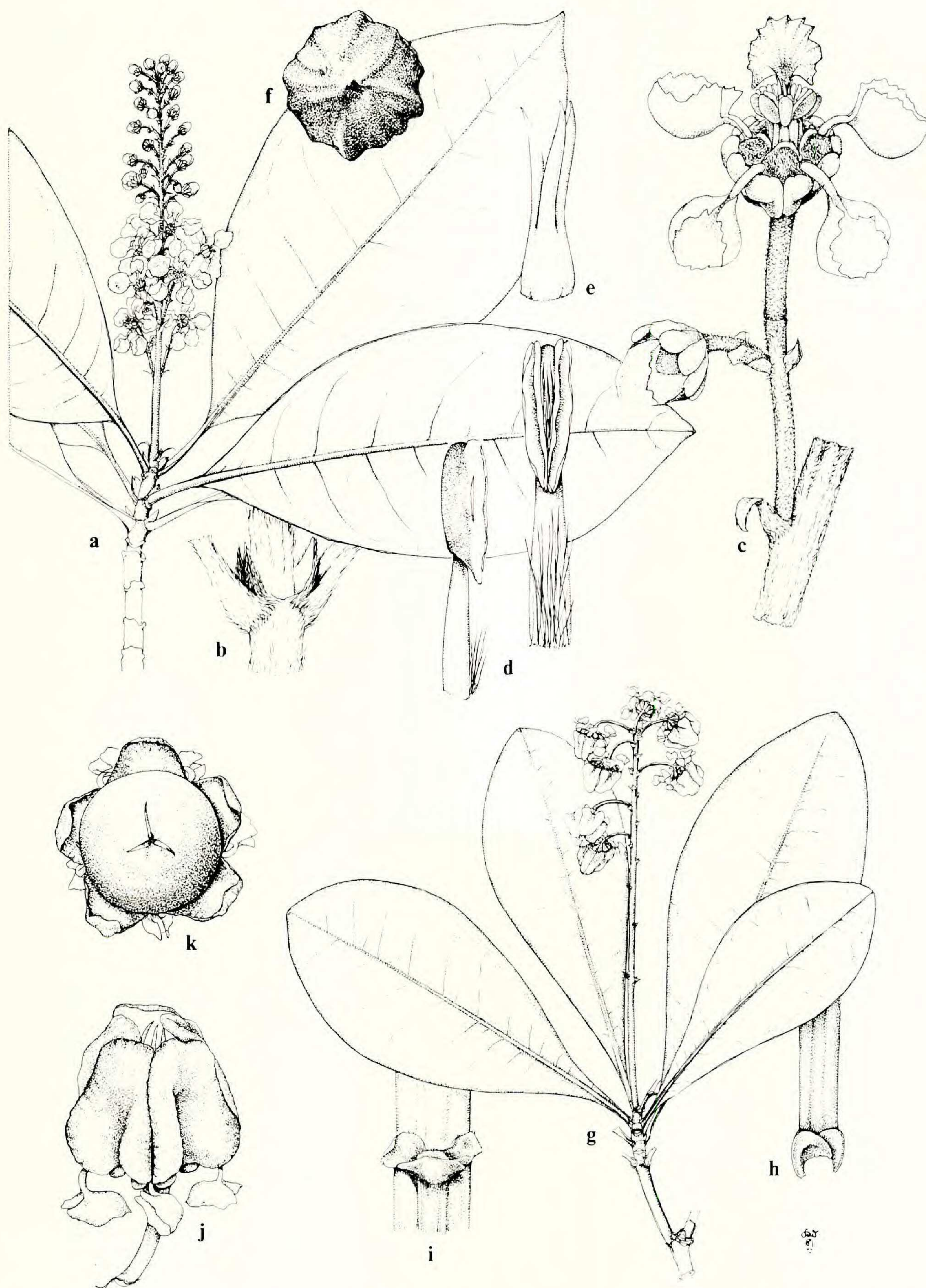


FIG. 3. *Byrsonima cacaophila* and *B. bahiana*. a-f, *B. cacaophila*: a) flowering branch, $\times 0.5$; b) stipules, $\times 2$; c) cincinnus, $\times 2.5$; d) stamens, $\times 7.5$; e) gynoecium, with anterior style to left, $\times 5$; f) fruit (dried) from above, $\times 1$. g-k, *B. bahiana*: g) fruiting branch, $\times 0.5$; h) stipules, adaxial view, $\times 2.5$; i) bract and bracteoles on inflorescence axis, $\times 5$; j) immature fruit with enlarged sepals and persistent petals, $\times 2$; k) fruit from above, $\times 1.3$. Drawn by Karin Douthit, a-e from *Belém & Pinheiro* 2881, f from *Belém & Magalhães* 637, g-k from *Harley* 18475.

persistently sericeous on the midrib or rarely on the lateral veins below, the lateral veins prominent, especially below, the reticulum prominulous on both sides; petiole 12–32 mm long, sericeous to glabrate; stipules 3.5–6.5 mm long, triangular, completely connate or free distally, smooth or abaxially sulcate, abaxially sericeous to glabrescent, adaxially glabrous. Inflorescence (8–) 11–19 cm long, sericeous proximally to loosely sericeous to velutinous distally; cincinni with 1–3 flowers; bracts mostly 3–5.5 mm long, shorter at apex of inflorescence, 1–1.5 mm wide, subulate, mostly revolute at apex or reflexed or twisted, abaxially sericeous, adaxially glabrous; primary floriferous peduncle (from bract to first joint) (2–) 4–10 mm long; bracteoles 1–2 mm long, 1–1.5 mm wide, ovate, abaxially sericeous, adaxially glabrous, borne at or up to 2 mm below apex of peduncle; bracts and bracteoles persistent past maturity of the fruit. Pedicel 5–7 mm long, loosely sericeous to velutinous, slightly circinate in bud, apparently straight in fruit. Flower 17 mm in diameter. Sepals all biglandular, 2 mm long beyond the glands, 2–3 mm wide, acute or obtuse at the apex and revolute in anthesis, abaxially sericeous, adaxially glabrous; glands 3–4 mm long. Petals white, turning reddish in age, glabrous; lateral petals reflexed, with the claw 2.5–3 mm long, the limb 5–6 mm long, 6–7 mm wide, concave; posterior petal erect, the claw 3–3.8 mm long, eglandular, the limb 4–4.5 mm long, 5–6 mm wide, corrugated. Filaments 2.5–3 mm long, abaxially glabrous or sparsely hirsute at base, adaxially hirsute at base; anthers yellow, 2.2–2.9 mm long, the locules linear, unwinged, sericeous, especially on inner faces, with the fusiform hairs only 0.3–0.5 mm long, the connective equalling the locules or occasionally exceeding them by up to 0.2 mm. Ovary 1.5 mm high, conical, sulcate, glabrous, all 3 locules fertile; styles 3.5–4 mm long. Fruit (dried) 11 mm long, 15–18 mm in diameter, glabrous, depressed, the nut with prominent bony ribs.

TYPE: BRAZIL. Bahia: Rod. Uruçuca a Taboquinha, plantaçao de cacau, 22 Nov 1971 fl, *T. S. Santos 2200* (CEPEC, holotype; MICH, isotype).

PARATYPES: BRAZIL. Bahia: Centro de Pesquisas do Cacau, CEPLAC, Ilhéus, Apr fr, *Belém & Magalhães 637* (CEPEC, IAN, NY, UB); Itapebí plantaçao de cacau, Nov fl, *Belém & Pinheiro 2881* (CEPEC, NY, UB); Itajuípe, plantaçao de cacau, Nov fl, *Belém & Pinheiro 2918* (CEPEC, NY, UB); Itabuna, Estrada da Burarema, mata de cacau, Nov fl, *Mello Filho 2902/Emmerich 3440* (CEPEC, R); Ilhéus, CEPEC, plantaçao de cacau, Dec fl, *Santos 530* (CEPEC, MICH).

I am not sure where this interesting species fits best in the taxonomy of the genus. It resembles *B. maguirei* Anderson in its stipules, inflorescence, anther-shape, and sulcate ovary, but differs in having reflexed bracts, white petals, hairy anthers, and all three carpels fertile. The reflexed subulate bracts suggest the complex that includes *B. crispa* Adr. Juss., but *B. cacaophila* differs from those species in its long peduncles, white petals, persistent bracts and bracteoles, and short fusiform anther-hairs.

The epithet *cacaophila* draws attention to the fact that all known collections of this species come from cacao plantations, including those from the CEPEC reserve, which was founded on an old plantation. When the native forests were cut many years ago to plant *Theobroma*, some native trees were left to shade the cacao trees. *Byrsonima cacaophila* seems to be one of those regularly spared; the species may owe its persistence to this practice. Many other undescribed species of those wonderful forests probably disappeared into extinction at that time.

According to the label with *Santos 2200*, this species has the common name “Aca.”

Byrsonima schunkei W. R. Anderson, sp. nov.

Fig. 4.

Byrsonima poeppigiana Adr. Jussieu var. *velutina* Niedenzu in Engler, Pflanzenr. IV. 141: 715. 1928. Lectotype: *Tessmann 3450* (NY!).

Frutex vel arbor 2–10 m alta. Lamina foliorum majorum 20–29 cm longa, 8–14 cm lata, apice acuminata, supra mox glabrata praeter costam plerumque velutinam, subtus dense et pertinaciter velutina; petiolus (16–) 20–31 mm longus, velutinus; stipulae 4–8 (–10) mm longae, connatae, apice rotundatae. Inflorescentia bracteis 3–6 (–10) mm longis, 1.5–2.5 mm latis, cincinnis 1–4-floris, pedunculis primariis 3–15 mm longis, bracteolis 1.5–4 (–7) mm longis, 1.5–3 (–5) mm latis, sub apice pedunculi portatis. Sepala adaxialiter appressotomentosa. Petala lutea. Antherae 2.0–3.5 mm longae, laxe sericeae praecipue inter loculos, connectivo loculos aequanti vel usque 0.5 mm superanti et apice ut videtur glanduloso. Ovarium sericeum.

Shrub or tree 2–10 m tall; stems velutinous, eventually glabrescent. Lamina of the larger leaves 20–29 cm long, 8–14 cm wide, elliptical or broadly elliptical or somewhat obovate, cuneate at the base, slightly revolute at the margin, acuminate (sometimes abruptly so) at the apex, soon glabrate above except usually persistently velutinous on the midrib and sometimes on the lateral veins, densely and persistently velutinous below, the hairs 0.25–0.50 mm long, erect, bifurcate, the branches as long as or shorter than the stalk; midrib and lateral veins prominent below; petiole (16–) 20–31 mm long, velutinous like the lamina with a proximal admixture of some longer, sub-basifixed hairs; stipules 4–8 (–10) mm long, connate, the pair rounded at the apex, abaxially loosely sericeous, adaxially glabrous. Inflorescence 6–24 cm long, velutinous; cincinni comprising 1–4 flowers, often better developed proximally than distally in the same inflorescence; bracts 3–6 (–10) mm long, 1.5–2.5 mm wide, subulate, lanceolate, or ovate, stiffly spreading or somewhat flexuous distally, abaxially sericeous, adaxially glabrous; primary floriferous peduncle (from bract to first joint) 3–15 mm long; bracteoles 1.5–4 (–7) mm long, 1.5–3 (–5) mm wide, ovate, borne at various heights on peduncle from just above base to somewhat below apex; bracts and bracteoles deciduous during or after anthesis, all gone before maturation of the fruit. Pedicel 4–8 mm long, velutinous, circinate in bud, decurved or twisted in fruit. Flower ca 13 mm in diameter. Sepals all biglandular, 2–3 mm long beyond the glands, rounded at the apex, revolute, appressed-tomentose, densely so abaxially, densely to sparsely so adaxially, accrescent in fruit; glands 2.5–4.5 mm long. Petals yellow, glabrous, the outermost covering all others in bud; lateral petals reflexed, with the claw 2.5–3 mm long, the limb 5.5–6.5 mm long, 6–8 mm wide, concave, especially in the anterior pair; posterior petal erect, the claw 3–4 mm long and thicker, eglandular, the limb 3–4 mm long, 3.5–4.5 mm wide, corrugated. Filaments 2.0–2.5 mm long, adaxially hirsute at very base with hairs only ca 0.5 mm long; anthers 2.0–3.5 mm long, loosely sericeous, especially between the locules, the connective equalling the locules or exceeding them by up to 0.5 mm and apparently glandular at the apex, the locules narrowly linear, separated on the connective, free at the apex. Ovary 1.3–1.6 mm high, conical, sericeous, at least on the distal half, all 3 locules fertile; styles 3–3.5 mm long, straight or slightly bent at the apex. Fruit yellow, 13–15 mm long, 11–13 mm in diameter (dried), ovoid with an attenuate apex, glabrate or distally thinly sericeous.

TYPE: PERU. San Martín: Prov. Mariscal Caceres, Dtto. Tocache Nuevo, Apr fl, *Schunke V. 3929* (MICH, holotype).

PARATYPES: PERU. San Martín: Mariscal Caceres, Tocache Nuevo, Mar fr, *Gentry et al. 25569* (MICH), Jan fr, *Schunke V. 3699* (MICH), Nov fl, *Schunke V. 5589* (MICH), Aug fr, *Schunke V. 6859* (MICH, MO), Jul fl, *Schunke V. 7332*



FIG. 4. *Byrsonima schunkei* and *B. surinamensis*. a-f, *B. schunkei*: a) flowering branch and large leaf, $\times 0.5$, with hair from abaxial side of lamina $\times 35$; b) stipules, $\times 1.5$; c) cincinnus, $\times 2.5$; d) stamens, with long and short anthers from same flower, $\times 5$; e) gynoecium, with styles bent away from posterior petal, $\times 5$; f) fruit, $\times 1$. g-l, *B. surinamensis*: g) flowering branch, $\times 0.5$, with leaf-tip $\times 5$; h) stipules, $\times 3.5$; i) flower bud with bracts and bracteoles, $\times 2.5$; j) stamens, with long and short anthers from same flower, $\times 7.5$; k) gynoecium, $\times 7.5$; l) fruit, drawn from behind to show enlarged sepals and twisted pedicel, $\times 1.5$. Drawn by Karin Douthit, a-e from Schunke 7332, f from Maas et al. P12974, g-k from Lindeman et al. 597, l from Mori & Bolten 8437.

(MO, US); Uchiza, Pampa Yacu, alt. 450 m, Jan fl/imm. fr, *Schunke V. 5750* (F, LA). Loreto: Yarina cocha, middle Ucayali, Dec fl, *Tessmann 3450* (NY). Huánuco: Villa Isabel, río Cuchara, Sep fr, *Schunke V. 5676* (F, LA). BRAZIL. Acre: Mpio. Rio Branco, highway to Pôrto Velho, *Albuquerque et al. 1279* (MICH); Porangaba, Rio Juruá-mirim, May fr, *Maas et al. P12974* (MICH, NY); km 45 Rod. Rio Branco-Pôrto Velho, Feb imm. fr, *Santos et al. 53* (MICH). Amazônas: Antimary, Rio Acre, Mar fr, *Huber s.n.* (MG 4251). BOLIVIA. Pando: Cobija, Dec fl, *Ule 9488* (MG).

Byrsonima schunkei is named in honor of José Schunke Vigo, who has made several beautiful collections of it. The species grows in tall forest or, more often, in secondary forest or thickets, always on *terra firma*. Schunke has reported the following common names for the species in Peru: "Indana," "Indano," "Indano Colorado," and "Sacha Uvilla." He also records the following uses in folk-medicine: "La corteza la utilizan los nativos para curarse de tuberculosis, bebiendo en cocimiento" (3929). "A quarter of a glass of a maceration of the bark is drunk for dysentery" (5750).

Nieden zu described this species as *B. poeppigiana* var. *velutina*, but his concept of the taxon was vague and his syntypes included at least one collection referable to a third species, *B. linguifera*. I am selecting a lectotype for Niedenzu's name here, but nevertheless I feel it would be best to give the taxon a distinct epithet at the level of species. *Byrsonima schunkei* belongs to a complex of four species native to western Amazonia, which are closely related but easily distinguished. The following key will facilitate their recognition:

1. Leaves sericeous to glabrate below, the hairs sessile, straight, appressed. *B. arthropoda* Adr. Juss.
1. Leaves thinly to densely velutinous below, the persistent hairs Y-shaped with a straight, erect stalk, the branches mostly shorter than the stalk.
 2. Leaves strongly revolute and persistently velutinous above over entire surface of lamina. *B. linguifera* Cuatr.
 2. Leaves flat or only slightly revolute at the margin, soon glabrate above or persistently velutinous on the midrib.
 3. Floriferous peduncle 0.3–2 mm long (–3 mm in fruit); bracteoles borne at apex of peduncle, 0.8–1.5 (–2) mm long, 1 mm wide; larger leaves with the lamina 10–19 cm long and 4.5–9 cm wide, the petiole 6–15 (–18) mm long; sepals adaxially glabrous. *B. poeppigiana* Adr. Juss.
 3. Floriferous peduncle 3–15 mm long; bracteoles borne below apex of peduncle, 1.5–4 (–7) mm long, 1.5–3 (–5) mm wide; larger leaves with the lamina 20–29 cm long and 8–14 cm wide, the petiole (16–) 20–31 mm long; sepals adaxially sparsely to densely appressed-tomentose. *B. schunkei* Anderson

***Byrsonima affinis* W. R. Anderson, sp. nov.**

Fig. 1.

Arbor (3–) 4–8 (–10) m alta, trunco 30 cm diametro, torto, suberoso. Lamina foliorum undulata, margine revoluta, basi auriculata, sessilis, subtus arcte lanata, reticulo subtus prominenti. Inflorescentia bracteis 3–6 mm longis, 2.5–3.5 mm latis, anguste triangularibus, revolutis et/vel reflexis, bracteolis 1–2.5 mm longis, bracteis bracteolisque deciduis. Petala lutea; petalum posticum ungue eglanduloso. Antherae 2.5–3.5 mm longae, loculis glabris, connectivo extus plerumque laxe sericeo, inter loculos semper sericeo, loculos non vel usque ad 0.4 mm superanti. Ovarium lanatum. Fructus usque ad 3.7 cm diametro, luteus, nuce 12 mm alta, 18 mm lata, trilobata, basi excavata.

Tree (3–) 4–8 (–10) m tall; trunk up to 30 cm (or more?) in diameter, often twisted, with thick, fissured, corky bark; young stems tomentose with admixture of spreading hairs, soon glabrescent. Lamina of the larger leaves 11–20 cm long,

4–9 (–10) cm wide, elliptical or slightly obovate, acute, obtuse, or rounded at the apex, undulate, revolute at the margin, shallowly to deeply auriculate at the base, sessile, glabrate above except tomentose on the midrib, glaucous and smooth or somewhat rugose above, tightly and persistently woolly below, the hairs light brown or white, the lateral veins and reticulum very prominent below; petiole none; stipules 4–6 mm long, smoothly and completely connate or distinct at the apex, acute, abaxially tomentose or loosely sericeous, adaxially glabrous. Inflorescence 12–24 cm long, erect in flower and pendent in fruit, densely and persistently tomentose, the flowers borne 1 per bract or in clusters (compact cincinni) of 2 (–3?) flowers; bracts 3–6 mm long, 2.5–3.5 mm wide, narrowly triangular, abaxially tomentose, adaxially glabrous, mostly revolute and/or reflexed; peduncle 0; bracteoles smaller than the bracts, especially shorter (1–2.5 mm long), revolute or not; bracts and bracteoles deciduous, sometimes during anthesis, often later. Pedicel 8–15 mm long, thickened and slightly elongated in fruit, densely spreading-tomentose or velutinous, straight or slightly circinate in bud, often somewhat decurved after anthesis but apparently \pm straight in mature fruit. Flower 18–22 mm in diameter. Sepals all biglandular, 2–3.5 mm long beyond the glands, 2.5–3.5 mm wide, obtuse or acute at the apex, abaxially densely appressed-tomentose, adaxially glabrous or distally tomentose, recurved at the apex in anthesis, accrescent (to ca twice as large) in fruit; glands 2–3.5 mm long, yellow. Petals yellow, turning red-orange in age, glabrous; lateral petals reflexed, with the claw 2.5–3.5 (–4) mm long, the limb 6–9 mm long, 7–11 mm wide; posterior petal with the claw 3–4.3 mm long, erect, eglandular, the limb 4–5.5 mm long, 5.5–7 mm wide, corrugated, reflexed. Filaments 2–3 mm long, abaxially glabrous, adaxially hirsute at the base; anthers 2.5–3.5 mm long, longer opposite sepals than petals, the locules glabrous, un-winged, often slightly free at the apex, the connective usually loosely sericeous outside locules and always sericeous between locules, often somewhat enlarged and flattened at the apex but not or hardly exceeding the locules (up to 0.4 mm). Ovary 1.8–2 mm high, densely woolly, all 3 locules fertile; styles 2.5–3.9 mm long, straight or bent away from the posterior petal. Fruit globose, to 3.7 cm in diameter, glabrate at maturity or persistently tomentose at the apex, yellow at maturity with thick juicy flesh, the nut 12 mm high and 18 mm wide, 3-lobed, deeply excavated at the base, leaving behind a rounded torus which fits into the excavation.

TYPE: BRAZIL. Mato Grosso: Mun. Rio Verde, Serra da Pimenteira, 25–35 km SW of town of Rio Verde, cerrado on sandy soil, 8 Feb 1975 fl/imm. fr, *Anderson 11274* (MBM, holotype; MICH, isotype).

PARATYPES: BRAZIL. Mato Grosso: Mun. Alto Araguaia, vic. of Riberão Claro, NW of Alto Araguaia, 800 m, cerrado, Feb fl, *Anderson 11404* (MICH); Cuiabá-Vilhena, Km 206, 56°28' W, 14°11' S, 550 m, campo cerrado, Mar fr, *Bamps 5498* (MICH); 12°54' S, 51°52' W, Xavantina-São Felix road, cerrado on red sandy soil, *R. R. de Santos et al. R.1244* (MO). Goiás: 12 km S of Caiapônia, 840 m, cerrado, Apr fl/fr, *Anderson 9518* (MICH, NY, UB); Mun. Rio Verde, open woodland, Jan fl/imm. fr, *Pedersen 12136* (MICH). Minas Gerais: 70 km S of Uberlândia, cerrado, Feb fl, *Anderson 12394* (MBM, MICH); Mun. Prata, cerrado, May fr (MICH); 9 km S of Frutal, cerrado, Mar fl, *Hatschbach 38223* (MICH); 4 km N of Patrocínio, 1000 m, cerrado, Jan fl, *Irwin et al. 25736* (MICH, NY); Mun. Frutal, sandy grassland with scattered trees, Jan fl, *Pedersen 12072* (MICH); Uberaba, *Regnell III 302* (MO).

Byrsonima affinis is closely related to *B. basiloba* Adr. Juss., a shrubby species which it resembles in herbarium specimens, which undoubtedly explains why it has not been named previously. The two species can be separated by the characters in the following couplet:

Tree (3–) 4–8 (–10) m tall, the trunk with thick, corky bark; lamina not only revolute at the margin but also undulate; anthers with the connective usually loosely sericeous outside locules and always sericeous between them; inflorescence pendent in fruit; fruit over 3 cm in diameter. *B. affinis*.

Shrub 0.3–1.5 (–2.5) m tall, much-branched from base, the stems not corky; lamina revolute at the margin but otherwise flat; anthers glabrous; inflorescence erect in fruit; fruit up to 2 cm in diameter. *B. basiloba*.

In addition to these differences, *B. basiloba* differs from *B. affinis* in the following tendencies: Its bracts are seldom revolute and mostly earlier deciduous; the anthers are generally shorter, probably seldom exceeding 2.5 mm in length; and the ovary is usually loosely sericeous instead of woolly, with the hairs straighter and more nearly parallel.

The distribution of *B. affinis* and *B. basiloba* is shown in Figure 5. For the most part the two species occur in different areas, but they seem to come very close together in the Triangulo Mineiro, south of Uberlândia. They should be studied in that area, to see whether they hybridize; perhaps they differ in ecological requirements that effectively separate them even there. The few collections of *B. basiloba* from the area of Vilhena, Rondônia, are disjunct from the rest of the species. They are somewhat atypical, especially in having smaller leaves and flowers, but they could not be assigned to any other species, certainly not to *B. affinis*. Further collection may reveal more populations of *B. basiloba* in cerrados across north-central Mato Grosso.

Byrsonima fonsecae W. R. Anderson, sp. nov.

Fig. 6.

Arbor 5 m alta. Lamina foliorum majorum 10.5–15.5 cm longa, 5.5–7.5 cm lata, obovata vel paene elliptica, apice plerumque rotundata, subtus parce

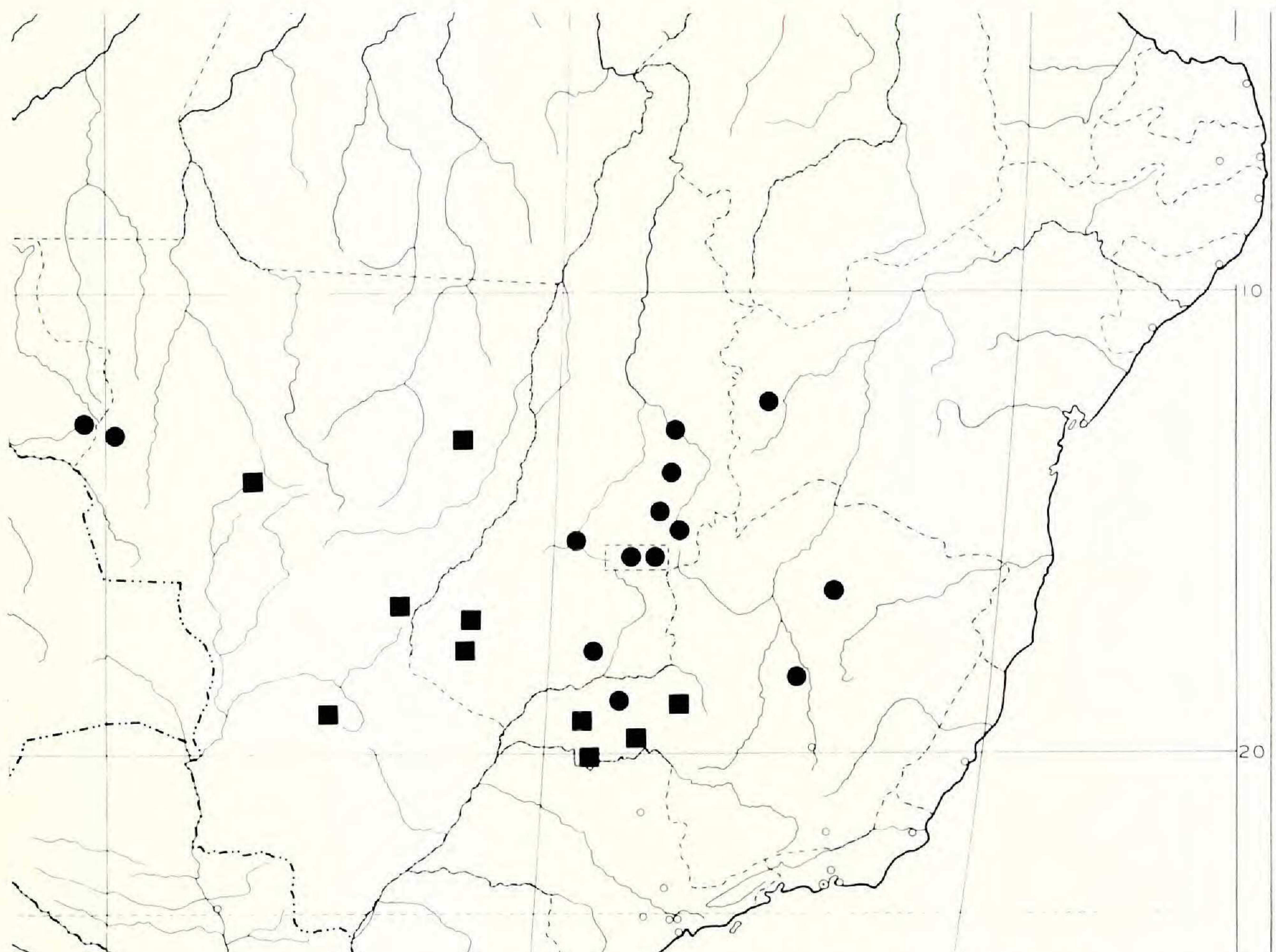


FIG. 5. Distribution of *Byrsonima affinis* (squares) and *B. basiloba* (circles). Goode Base Map 203, Copyright The University of Chicago.

appresso-tomentosa vel subsericea; petiolus 14–20 mm longus; stipulae 4–6 mm longae, omnino connatae vel apice distinctae. Inflorescentia bracteis 1.5–2.5 mm longis, 1.5–2 mm latis, persistentibus, pedunculis 1.5–6 (–10) mm longis, bracteolis bracteis similaribus vel minoribus. Pedicellus circinatus in alabastro, decurvatus in fructu. Sepala utrinque tomentosa, valde appressa per anthesin. Petala alba, demum rosea. Antherae glabrae, loculis cylindricis, 1.4–1.6 mm longis, connectivo 0.3–0.9 mm superatis. Fructus 12–13 mm diametro (siccus).

Tree 5 m tall, the stems thinly sericeous to glabrate. Lamina of the larger leaves 10.5–15.5 cm long, 5.5–7.5 cm wide, obovate or nearly elliptical, cuneate at the base, revolute at the margin, mostly rounded at the apex, sometimes emarginate, sometimes broadly obtuse, coriaceous and somewhat rugose above, soon glabrate above or loosely sericeous on the midrib and lateral veins, thinly appressed-tomentose or subsericeous below with some hairs straight and appressed and others twisted and spreading, eventually glabrescent, the lateral veins and reticulum visible above, prominent below; petiole 14–20 mm long, loosely sericeous to glabrate; stipules 4–6 mm long, completely connate or free just at the apex, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence 4–12 cm long, loosely sericeous or tomentose to subvelutinous, the cincinni mostly 1-flowered, a few 2- or 3-flowered; bracts 1.5–2.5 mm wide, lanceolate or ovate, abaxially appressed-tomentose, adaxially glabrous, all or most persistent past maturity of the fruit; peduncle 1.5–6 (–10) mm long; bracteoles like the bracts or somewhat smaller, apical or 1 slightly subapical. Pedicel 7–8.5 mm long (somewhat longer in fruit), appressed-tomentose, circinate in bud, decurved and eventually twisted in fruit. Flower 13 mm in diameter. Sepals all biglandular, 1.5–2 mm long beyond the glands, 2–2.5 mm wide, obtuse or rounded, reddish-tomentose on both sides, strongly appressed in anthesis, somewhat accrescent in fruit (to ca 4 mm long and 5 mm wide); glands 2.5–3 mm long, pink. Petals glabrous, white, their claws becoming red or pink in age, the posterior petal with a yellow claw, the whole petal becoming red in age; lateral petals spreading, with the claw 3–3.5 mm long, the limb 4.5–5.5 mm long, 6–7 mm wide, concave, especially in the anterior pair; posterior petal erect, the claw 3 mm long and thicker, the limb 3.5–4.5 mm long, 4 mm wide, corrugated. Filaments 2–2.7 mm long, abaxially nearly glabrous, adaxially long-hirsute, especially on proximal ½; anthers 1.7–2.4 mm long, glabrous, the locules 1.4–1.5 mm long, cylindrical, separated on the connective, rounded and sometimes slightly detached at the apex, the connective yellow, extended 0.3–0.9 mm beyond the locules, the extension rounded or obtuse and somewhat recurved. Ovary ca 1.5 mm high, ovoid, glabrous, all 3 locules fertile; styles 3–3.5 mm long, white, all bent distally away from the posterior petal. Fruit 12–14 mm in diameter (dried), green, depressed-globose, short-beaked, glabrous, the nut prominently ribbed.

TYPE: BRAZIL. Minas Gerais: Serra do Cipó, ca 1225 m elev, in woods near stream, 18 Feb 1972 fl/fr, *Anderson et al.* 36183 (UB, holotype; MICH, NY, isotypes).

Byrsonima fonsecae is named in honor of Sidney Geraldo da Fonsêca, plant collector, mechanic, and friend, whose diverse talents were critical to the success of many expeditions in central Brazil led by Howard Irwin, myself, and others. It seems to be most similar to *Byrsonima vernicosa* Niedenzu, a rare plant known only from near Petrópolis outside Rio de Janeiro, and *B. nervosa* DC., a species common in the Planalto of Brazil. All three have similar anthers, large fruits, pedunculate flowers, and large, petiolate, obovate, coriaceous leaves. However, *B. vernicosa* and *B. nervosa* have the leaves very densely and persistently tomentose below, whereas in *B. fonsecae* the lamina is only thinly hairy below at matu-

rity. Glaziou stated that *B. vernicosa* has yellow petals, but this requires confirmation, because all other species with anthers of this type have the petals white/pink.

Byrsonima souzae W. R. Anderson, sp. nov.

Fig. 6.

Arbor 15 m alta. Lamina foliorum majorum 16–23.5 cm longa, 10.5–14 cm lata; petiolus 32–60 mm longus; stipulae 3–6 mm longae, omnino connatae. Inflorescentia floribus in cymulis 3-floris dispositis, bracteis 1–2 mm longis latisque, post maturitate fructus persistentibus, pedunculo 2–10 mm longo, bracteolis bracteis similibus vel minoribus, persistentibus. Petala rubra, glabra. Antherae glabrae, connectivo glanduloso loculos 1.2 mm superanti, conoideo. Ovarium sericeum; styli 2 mm longi, recti. Fructus 21–25 mm diametro, 10–13 mm altus; nux disciformis.

Tree 15 m tall, the trunk 13 cm in diameter; stems densely sericeous or appressed-tomentose with short, somewhat twisted hairs, eventually glabrescent. Lamina of the larger leaves 16–23.5 cm long, 10.5–14 cm wide, obovate or broadly elliptical, cuneate or rounded and often slightly decurrent at the base, rounded at the apex and often abruptly short-acuminate with the acumen up to 1 cm long, glabrate at maturity or sparsely appressed-tomentose on the midrib, especially below, the veins and reticulum prominent on both sides; petiole 32–60 mm long, sericeous like the stems to glabrate; stipules 3–6 mm long, smoothly and completely connate, rounded at the apex, abaxially appressed-tomentose to glabrate, adaxially glabrous. Inflorescence 15–18 cm long, appressed-tomentose like the stem, composed of short cymules of at least 3 flowers, possibly more; bracts 1–2 mm long and wide, broadly ovate, abaxially tomentose, adaxially glabrous; primary floriferous peduncle (from bract to joint) 2–10 mm long, longest at base of inflorescence and diminishing distally; peduncles of lateral branches of cymule apparently not developing; bracteoles like the bracts or smaller, the first bracteoles often borne below apex of peduncle; bracts and bracteoles persistent past maturity of fruit. Pedicel ca 5 mm long in flower, probably longer in fruit, tomentose, somewhat circinate in bud, perhaps straight in fruit. Flower ca 16 mm in diameter. Sepals all biglandular, ca 2 mm long beyond the glands, 2.5 mm wide, obtuse or rounded, abaxially appressed-tomentose, adaxially glabrous, strongly appressed in anthesis, wider but not or hardly longer in fruit; glands 3–4 mm long, white. Petals red, glabrous; lateral petals reflexed, with the claw 2–3 mm long, the limb 4–6 mm long, 5–6 mm wide; posterior petal erect or somewhat reflexed, the claw 2.5 mm long, the limb 3 mm long and wide. Filaments 2 mm long, abaxially glabrous, adaxially hirsute at the base; anthers 2.1–2.4 mm long, glabrous, the locules 0.9–1.2 mm long, unwinged, tapered distally to an acute apex, the connective enlarged and glandular, 1.7–1.8 mm long, extending ca 1.2 mm beyond the locules, tapered distally to a point, straight or somewhat recurved. Ovary 1.5 mm high, densely sericeous, all 3 locules fertile; styles 2 mm long, straight. Fruit 21–25 mm in diameter and 10–13 mm high, transversely depressed-obtrulloid, with the thin orange flesh following the contours of a disc-shaped nut, glabrate or sparsely sericeous distally.

BRAZIL. TYPE: Amazonas: Manaus, Km 45 da BR 17, t. firme, solo argiloso, mata virgem, 3 May 1961 fl, *Rodrigues & Coelho* 2462 (INPA, holotype; NY, SP, isotypes). PARATYPE: Amazonas: Manaus, Estr. Torquato Tapajós, Km 105, lado direito, solo argiloso, Sep fr, *Rodrigues & Loureiro* 7168 (INPA, NY).

This species is named in honor of my late friend, Raimundo Souza, a fine field botanist whose participation was a great asset to scores of expeditions led by



FIG. 6. *Byrsonima fONSECAE* and *B. souzAE*. a-h, *B. fONSECAE*: a) flowering branch, $\times 0.5$, with enlarged portion of abaxial side of lamina $\times 2$; b) stipules, $\times 3.5$; c) portion of inflorescence with pedunculate flower-bud, $\times 2.5$; d) flower, $\times 2.5$; e, f) stamens, $\times 10$; g) gynoecium, with styles bent away from posterior petal, $\times 5$; h) fruit, $\times 1.5$. i-p, *B. souzAE*: i) leaves and axis of inflorescence, $\times 0.5$; j) stipules, $\times 1.5$; k) reconstructed cymule, $\times 2.5$; l) apex of peduncle to show bracteoles of cymule, $\times 7.5$; m, n) stamens, $\times 10$; o) gynoecium, $\times 7.5$; p) fruit, with flesh and base in longitudinal section to expose the nut, $\times 0.75$. Drawn by Karin Douthit, a-h from Anderson *et al.* 36183, i-o from Rodrigues & Coelho 2462, p from Rodrigues & Loureiro 7168.

both Brazilians and foreigners in all parts of Brazil. *B. souzae* is probably most closely related to *B. christianeae* Anderson, to which it is quite similar in most features, including the anthers and gynoeceum. They differ in the inflorescence and fruit, both of which are unique in *B. souzae*. Its flowers are borne in stalked, dichasial cymules, with both bracteoles fertile, instead of one-sided, helicoid cymules (cincinni) as in other Malpighiaceae with compound inflorescences. I cannot tell from the material at hand whether more than three flowers develop in older cymules. *B. christianeae* has the flowers borne 1–3 in a cluster, actually a sessile cincinnus. The bizarre fruit of *B. souzae*, with a wide, depressed, disc-shaped nut, is quite different from the globose fruit of *B. christianeae* and all other species of *Byrsonima*.

Byrsonima spinensis W. R. Anderson, sp. nov.

Fig. 2.

Arbor 4–6 m alta. Lamina foliorum majorum 4–8 (–9) cm longa, 1.8–3.2 (–3.6) cm lata, plerumque obovata, apice obtusa vel rotundata, glabrata vel paene glabrata; petiolus 6–9 (–10) mm longus; stipulae 1.6–2.3 mm longae, omnino connatae vel apice distinctae. Inflorescentia bracteis bracteolisque persistentibus, cincinnis 1–2-floris, pedunculo plerumque 1–5 mm longis. Pedicellus circinatus in alabastro, decurvatus in fructu. Sepala utrinque sparsissime sericea, valde appressa per anthesin. Petala alba, demum rosea. Antherae glabrae, loculis cylindricis, 1–1.6 mm longis, connectivo 0.7–1.1 mm superatis.

Tree 4–6 m tall, the stems initially sericeous (?), soon glabrate. Lamina of the larger leaves 4–8 (–9) cm long, 1.8–3.2 (–3.6) cm wide, obovate or sometimes elliptical, obtuse or rounded at the apex (sometimes abruptly short-acuminate), slightly revolute at the margin, tapered or cuneate at the base, soon glabrate or very sparsely sericeous below on the midrib, the lateral veins and reticulum visible but hardly prominulous; petiole 6–9 (–10) mm long, thinly sericeous to glabrate; stipules 1.6–2.3 mm long, completely connate or distinct just at the apex, smooth or sulcate in the middle, abaxially sericeous to glabrate, adaxially glabrous. Inflorescence 3–8 cm long, thinly sericeous to glabrate, the cincinni 1–2-flowered; bracts 1–2 mm long, ca 1 mm wide, triangular, glabrous or abaxially thinly sericeous, stiff; primary floriferous peduncle (from bract to joint) mostly 1–5 mm long, occasionally undeveloped; bracteoles like the bracts but smaller; bracts and bracteoles persistent at least past flowering. Pedicel (3.5–) 5–8 (–10) mm long, sericeous, moderately circinate in bud, decurved in old flowers and enlarging fruits. Flower 12–16 mm in diameter. Sepals all biglandular, 1.5–2.3 mm long beyond the glands, 2–2.5 mm wide, broadly obtuse or rounded, very sparsely sericeous on both sides and ciliate on the margin, strongly appressed in anthesis; glands white in bud, pink in anthesis, 1.6–2.5 mm long. Petals white, becoming pink in age, glabrous; lateral petals spreading to reflexed, the claw 2.5–3.5 mm long, the limb 4–5.5 mm long, 4.5–6 mm wide; posterior petal erect, the claw 2.7–3 mm long, the limb 3–3.5 mm long, 4–4.5 mm wide, corrugated. Filaments 2–2.5 mm long, sparsely hirsute abaxially at base, hirsute adaxially on proximal half; anthers 1.8–2.4 mm long, glabrous, the locules 1–1.6 mm long, cylindrical, rounded or minutely apiculate and sometimes slightly detached at the apex, the connective yellow, extended 0.7–1.1 mm beyond the locules, the extension conoid, bluntly pointed, nearly straight to recurved. Ovary 1–1.5 mm high, glabrous, all 3 locules fertile; styles 3.1–3.7 mm long, straight or bent away from the posterior petal. Fully enlarged fruit not seen.

TYPE: BRAZIL. Minas Gerais: Serra do Espinhaço, valley ca 5 km SSE of Pico de Itambé, 1140 m, by stream, 14 Feb 1972 fl, *Anderson et al.* 35969 (UB, holotype; MICH, NY, isotypes).

PARATYPES: BRAZIL. Minas Gerais: Serra do Espinhaço, ca 8 km N of Gouveia on road to Diamantina, 1220 m, wet place at edge of gallery forest, Feb fl, *Anderson et al.* 35339 (MICH, NY); same locality and date as type, *Anderson et al.* 35970 (MICH, NY, UB).

This species is closely related to *Byrsonima myricifolia* Grisebach, which is also a much-branched tree with similar clusters of small, nearly glabrate leaves. They both have the petals all white, turning pink in age, the bracts and bracteoles persistent, and the floriferous peduncle usually well developed. *Byrsonima spinensis* differs from *B. myricifolia* in having the pedicel circinate in bud and in having many of the cincinni 2-flowered; in *B. myricifolia* the pedicels are straight, even in very young buds, and the cincinni seem never to bear a second flower. Also, the lamina is usually obtuse or rounded in *B. spinensis*, acuminate or acute in *B. myricifolia*.

The epithet *spinensis* refers to the elongated Serra do Espinhaço; *espinhaço* is a Portuguese word meaning backbone or spine.

Byrsonima bahiana W. R. Anderson, sp. nov.

Fig. 3.

Arbor 8 m alta. Lamina foliorum majorum 8–10.5 cm longa, 4.3–5.6 cm lata, obovata, apice rotundata vel obtusa, coriacea, fere glabra; petiolus 14–16 mm longus; stipulae 1.5–2.5 mm longae, distinctae, rotundatae. Inflorescentia fere glabra, bracteis bracteolisque 1.2–1.5 mm longis, usque ad 1.9 mm latis, rotundatis, persistentibus. Pedicellus decurvatus in fructu. Sepala glandulas 2.5 mm superantia, apice rotundata, fere glabra, in fructu carnosae et accrescentia, minimum 10 mm longa et 9 mm lata, basi auriculata. Petala alba et rosea. Antherae 2–2.5 mm longae, glabrae, loculis ut videtur nec complanatis nec alatis, connectivo vix superatis (0.1 mm). Ovarium glabrum, tantum 2 loculis fertilibus. Fructus immaturus ca 15 mm diametro.

Tree to 8 m tall, the trunk 20 cm in diameter; stems initially very thinly sericeous, soon quite glabrate except short-hirsute in axils of stipules. Lamina of larger leaves 8–10.5 cm long, 4.3–5.6 cm wide, obovate to almost elliptical, rounded or obtuse at the apex, revolute at the margin, cuneate at the base, coriaceous, tinged with red above, especially on margin and midrib, glabrous or bearing a few straight appressed hairs on the midrib below, not glaucous below, not or slightly glaucous above, the principal lateral veins ca 10, prominulous below; petiole 14–16 mm long, glabrous or bearing a few straight appressed hairs; stipules 1.5–2.5 mm long, distinct, broadly rounded, inserted so that one stands partially inside the other, glabrous. Inflorescence 10.5–11 cm long, sericeous at the very base, distally very sparsely sericeous to glabrate, the flowers borne 1 per bract; bracts 1.2–1.5 mm long, 1.6–1.9 mm wide, broadly rounded, glabrous or bearing a few hairs; peduncle none; bracteoles about as long as the bracts but narrower, usually not as wide as long; bracts and bracteoles persistent past maturity of the fruit. Pedicel in fruit 10–13 mm long, bearing scattered appressed hairs, decurved. Sepals all biglandular, 2.5 mm long beyond the glands, 3 mm wide, rounded, glabrous except for tiny hairs on the margin, revolute in anthesis, appressed and greatly enlarged in fruit; glands 2.5–3 mm long. Petals “strongly reflexed with reddish claw and small concave white limb, often tinged with pink,” persistent in immature fruit. Filaments 2–3 mm long, abaxially glabrous, adaxially hirsute at base; anthers 2–2.5 mm long, glabrous, the locules apparently not flattened or winged, exceeded only slightly (0.1 mm) by the connective. Ovary 1.5 mm high, glabrous, with only 2 locules developed and fertile. Immature fruit ca 15 mm in diameter, with thick flesh around a small nut ca 5–6 mm in diameter, glabrous; accrescent sepals fleshy, appressed, at least 10 mm long and 9 mm wide, somewhat auriculate at the base.

TYPE: BRAZIL. Bahia: 5 km SE of Marau, 39°00' W, 14°08' S, low restinga on sand, elev. 0–50 m, 2 Feb 1977 fr, *Harley 18475* (CEPEC, holotype; MICH, isotype).

This species is readily placed in Niedenzu's series *Platylepis* on the basis of its white and pink petals, distinct stipules, and small, subequal, persistent bracts and bracteoles. It is most similar to *Byrsonima laevis* Niedenzu and *B. amoena* Cuatrecasas. The most dramatic characteristic distinguishing *B. bahiana* is its fleshy sepals that are large in flower and enlarge greatly in fruit. In contrast to the dimensions given above for this species, the sepals of *B. laevis* and *B. amoena* are only 1.5 mm long or less in flower and enlarge to no more than 4 mm long in fruit. In *B. bahiana* the calyx glands, filaments, and anthers are longer than in *B. laevis* and *B. amoena*; also, the anther locules in *B. bahiana* do not appear to be flattened and winged as in the other two species, and the ovary has only two locules fertile instead of three. Additional differences may become apparent when good flowering material of *B. bahiana* is available for study. The type bears immature fruits and my only flowers were old, degraded, and incomplete.

Byrsonima laevis and *B. amoena* are species of northwestern Amazonia, in the drainage area of the Rio Negro in Brazil, Venezuela, and Colombia. *B. bahiana* is known only from the type, which was collected 2500 km from Manaus, where *B. amoena* grows, and even farther from the nearest populations of *B. laevis*. The Amazonian affinities of many species of coastal Bahia have been abundantly documented, but this is still an impressive disjunction. Also, it is worth noting that this is a species of white-sand restinga, not wet forest as is true of many species or species-pairs disjunct between Bahia and Amazonia. *Byrsonima laevis* and *B. amoena* are also species of open, white-sand vegetation, the Rio Negro analogue of the restingas of Bahia. This suggests that when the Amazonian flora extended down the coast into Bahia, it probably comprised not only forests, but white-sand "campinas," just as it does today.

Byrsonima alvimii W. R. Anderson, sp. nov.

Fig. 7.

Arbor usque ad 20 m alta. Lamina foliorum majorum 12–18 cm longa, 5.5–9.3 cm lata, omnino vel fere glabra; petiolus 18–25 mm longus; stipulae 5–7 mm longae, omnino connatae, glabrae. Inflorescentia bracteis 4–7 mm longis, 2–3.3 mm latis, reflexis, demum deciduis (?), cincinnis 1–3-floris, pedunculo (0–) 1–4.5 mm longo, bracteolis bracteis similibus, 2.5–4 mm longis, plerumque non reflexis. Pedicellus circinatus in alabastro. Sepala utrinque velutina vel sericea. Petala rosea. Antherae loculis sericeis vel hirsutis praecipue apice, cylindricis, 1.5–2.1 mm longis, apice rotundatis, connectivo (0.4–) 0.7–1.1 mm superatis. Ovarium glabrum; styli 4.5–5 mm longi.

Tree to 20 m tall, the trunk 35 cm in diameter; stems nearly glabrous except hirsute in axils of stipules. Lamina of the larger leaves 12–18 cm long, 5.5–9.3 cm wide, elliptical, acute or obtuse and apparently abruptly falcate at the apex, revolute at the margin, cuneate at the base, coriaceous, glabrous or with a few appressed hairs on the midrib below, the principal lateral veins 8–10, moderately prominent below; petiole 18–25 mm long, glabrous or very sparsely sericeous; stipules 5–7 mm long, smoothly and completely connate, the pair broadly triangular, wider than the petiole, glabrous. Inflorescence 13–16 cm long, sericeous proximally to velutinous distally; cincinni 1–3-flowered, the second and third flowers more likely to develop in proximal cincinni; bracts 4–7 mm long, 2–3.3 mm wide, flat, lanceolate, mostly strongly reflexed, loosely and sparsely sericeous to glabrate; primary floriferous peduncle (0–) 1–4.5 mm long, longest in proximal cincinni, velutinous; bracteoles like the bracts but smaller (2.5–4 mm long, 1.2–2.5 mm wide), mostly not reflexed; bracts and bracteoles

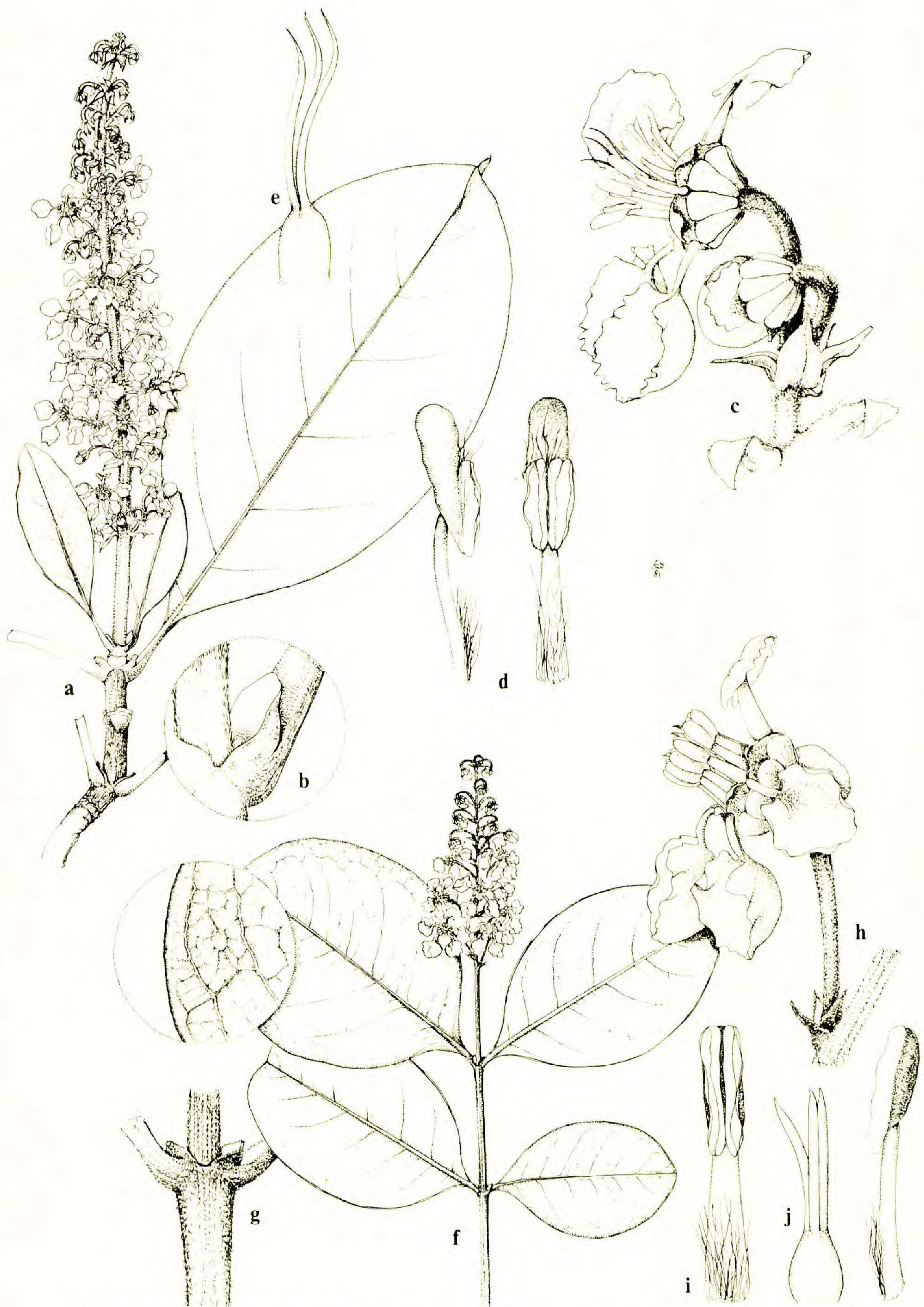


FIG. 7. *Byrsonima alvimii* and *B. morii*. a–e, *B. alvimii*: a) flowering branch, $\times 0.5$; b) stipules, $\times 2.5$; c) cincinnus, with 1 posterior-lateral petal removed from flower, $\times 2.5$; d) stamens, $\times 7.5$; e) gynoecium, with tips of styles bent away from posterior petal, $\times 5$. f–j, *B. morii*: f) flowering branch, $\times 0.5$, with reticulum of upper surface of lamina $\times 1.5$; g) stipules, $\times 2.5$; h) flower, $\times 2.5$; i) stamens, $\times 7.5$; j) gynoecium, with anterior style to left, $\times 5$. Drawn by Karin Douthit from the types.

apparently deciduous late in anthesis or afterwards. Pedicel 9–11 long, velutinous, circinate in bud. Flower 18 mm in diameter. Sepals all biglandular, 1.5–2 mm long beyond the glands, 2.5 mm wide, obtuse, densely velutinous or sericeous on both sides, erect or revolute at the apex in anthesis; glands 2.5–3.5 mm long. Petals pink, glabrous; lateral petals reflexed, the claw 3.5–4 mm long, the limb 6–8 mm long, 7–9 mm wide; posterior petal erect, the claw 4 mm long, the limb 5 mm long and wide, corrugated. Filaments 3–3.5 mm long, abaxially glabrous or sparsely hirsute at base, adaxially densely red-hirsute on proximal $\frac{1}{2}$ and sometimes sparsely hirsute distally; anthers 1.9–3.2 mm long, longest opposite 3 anterior sepals and shortest opposite 3 posterior petals, the locules 1.5–2.1 mm long, cylindrical, sericeous or hirsute, especially at the apex, rounded and sometimes detached at the apex, the connective yellow, massive, extended 0.7–1.1 mm beyond the locules (only 0.4 mm in anther opposite posterior petal), the extension truncated or bluntly pointed, straight or slightly recurved. Ovary 1.8 mm high, glabrous, all 3 locules fertile; styles 4.5–5 mm long, bent in the distal $\frac{1}{2}$ – $\frac{1}{3}$. Fruit not seen.

TYPE: BRAZIL. Bahia: Una, Faz. São Rafael, mata, 10 Nov 1969 fl, *T. S. dos Santos* 479 (CEPEC, holotype; MICH, isotype).

PARATYPE: BRAZIL. Bahia: Ubaitaba-Maraú, Dec fl, *Vinha* 53 (CEPEC, MICH).

Another collection that may well represent this species is *Pinheiro* 1691 (or 1601?) (MICH). It was a tree 15 m tall, collected in forest on the road from Santa Luzia to Canavieiras, Bahia. The material is in very young bud, so that color of the petals was not known, but the anthers do seem to be hairy and the connective exceeds the locules. It resembles *B. alvimii* in the size and shape of the leaves, bracts, and bracteoles, but all parts of the plant are much hairier and the stipules are smaller.

Byrsonima alvimii is named in honor of Dr. Paulo de T. Alvim, who as Scientific-Technical Director at CEPLAC has played an important role in encouraging collection and study of the flora of Bahia.

This species falls into Niedenzu's series *Psilonemis*, due to its pink petals and hairy anthers with an extended connective. Within that group, it seems to have no close relatives. It is distinguished by its stature, large coriaceous petiolate leaves, 1–3-flowered cincinni with the peduncle often developed, very large bracts and bracteoles, and sepals densely hairy on both sides. It seems to be most similar to *B. schomburgkiana*, but I am not convinced that they are really very closely related.

According to the label on the type, the common name of this species is "mucambo roxo."

Byrsonima surinamensis W. R. Anderson, sp. nov.

Fig. 4.

Arbor 6–17 m alta, ramis sericeis. Lamina foliorum majorum 5–8.5 (–10) cm longa, 2.4–3.7 cm lata, anguste obovata, apice plerumque rotundata vel emarginata, mucronata; petiolus 2–4 (–5) mm longus, laxe sericeus vel demum glabrescens. Inflorescentia bracteis bracteolisque caducis, pedunculo nullo, floribus singulis. Pedicellus 4–5.5 mm longus (–10 mm in fructu), rectus vel paulo circinatus in alabastro, decurvatus vel tortus in fructu. Petala rosea. Antherae 1.4–2.8 mm longae, loculis 0.8–1.0 mm longis, cylindricis, distaliter laxe sericeis, apice rotundatis vel acutis, connectivo loculos 0.6–1.8 mm superanti. Ovarium glabrum; styli 2.5 mm longi. Fructus sepalis accrescentibus, usque 6–8 mm longis, distaliter 3–4 mm latis, lingulatis, proximaliter auriculatis, membranaceis.

Tree 6–17 m tall, the trunk 15–30 cm in diameter; stems densely sericeous, glabrescent only belatedly; internodes mostly very short, the leaves borne in dense apical clusters. Lamina of the larger leaves 5–8.5 (–10) cm long, 2.4–3.7 cm wide, obovate or narrowly obovate, gradually narrowed to cuneate at the base, broadly obtuse or (usually) rounded or emarginate and mucronate at the apex, glaucous below, glabrate at maturity except loosely sericeous on the midrib, especially below, and on the apical mucro, with scattered appressed hairs persistent elsewhere on the lamina, the lateral veins prominulous below or on both sides; petiole 2–4 (–5) mm long, loosely sericeous or eventually glabrescent; stipules 2–3.5 mm long, smoothly connate but the pair usually emarginate at the apex, abaxially sericeous, adaxially glabrous. Inflorescence 6–12 cm long, velutinous-tomentose; flowers borne 1 per bract; bracts 2.5–3.5 mm long, ca 1 mm wide, narrowly lingulate, spreading and \pm straight, abaxially loosely sericeous, adaxially glabrous or sparsely sericeous in the center; peduncle none; bracteoles like the bracts but shorter; bracts and bracteoles deciduous before anthesis. Pedicel 4–5.5 mm long (–10 mm in fruit), appressed-tomentose, straight or slightly circinate in bud, decurved or sigmoid-twisted in fruit. Sepals all biglandular, 2 mm long beyond the glands, ca 2 mm wide, ovate-lingulate, strongly revolute in anthesis, abaxially appressed-tomentose, especially in the center, and ciliate on the margin, adaxially loosely sericeous proximally, accrescent (especially elongated) in fruit; glands 1.8–2.4 mm long, reddish. Petals pink, glabrous, the outermost covering all others in bud; lateral petals reflexed, with the claw 2.5–3 mm long, the limb 5–6.5 mm long, 5.7–7.3 mm wide, concave, especially in the anterior pair; posterior petal erect, the claw 3 mm long and thicker, the limb 4 mm long, 4.5 mm wide, corrugated. Filaments 1.5–2 mm long, longer opposite petals than sepals, abaxially glabrous, adaxially hirsute on the proximal $\frac{1}{2}$; anthers 1.4–2.8 mm long (in the same flower), loosely sericeous on the locules, especially distally, the locules 0.8–1.0 mm long, rounded or acute and slightly detached at the apex, cylindrical, the connective extended 0.6–1.8 mm beyond the locules, the extension cylindrical, blunt, straight or the longer ones recurved, longest on anterior stamens and shortest on posterior. Ovary 1.5 mm high, ovoid, glabrous, all 3 locules fertile; styles 2.5 mm long, straight. Fruit ca 9–10 mm in diameter, glabrous; accrescent sepals 6–8 mm long, distally 3–4 mm wide, lingulate, basally somewhat auriculate, membranous.

TYPE: SURINAME. Lely Mts., 175 km SSE of Paramaribo, east slope of plateau no. 1, 500–700 m, 10 Oct 1976 fr, *Mori & Bolten 8437* (MICH, holotype; NY and 7 undistributed duplicates, isotypes).

PARATYPES: SURINAME. Nassau Mts., savanna forest near km 11.6, 16 Mar sterile, *Lanjouw & Lindeman 2737* (IAN); Lely Mts., SW plateaus covered by ferrobauxite between 550 and 710 m alt., along base line on plateau 5 in low savanna-like forest on ferrite, 30 Sep fl, *Lindeman et al. 597* (MO, NY).

Byrsonima surinamensis is similar to *B. schomburgkiana* Benth, a species known from southern Guyana and adjacent Brazil and Venezuela. *B. schomburgkiana* differs in the following characteristics: More twisted hairs of stems and leaves, producing a vesture that I would call tomentose; larger and especially wider leaves that are more gradually tapered distally, with a longer petiole; persistent bracts and bracteoles; longer pedicels; anthers with longer locules (1.3–1.9 mm) and the connective extended only 0.5–1.1 mm beyond the locules; longer styles. For a full description, see p. 98 of my Guayana Highland paper (1981).

Byrsonima aubletii Kostermans, Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 25: 10. 1936, *nom. nov.* for *B. altissima* (Aublet) DC.

Malpighia altissima Aublet, Hist. Pl. Guiane Franç. 1: 455. 1775, not *M. altissima* Jacquin, 1764. Type: Aublet, French Guiana, "in sylvis Sinemariensibus" (BM!).

Byrsonima altissima (Aublet) DC. Prodr. 1: 579. 1824.

Byrsonima discolor Pilger, Repert. Spec. Nov. Regni Veg. 42: 179. 1937. Type: Ducke, Brazil, Pará, ilhas altas do Macujubinsinho (RB 20950!).

Tall tree, 18–30 m tall. Lamina of the larger leaves 10–15 cm long, 5.5–8 cm wide, elliptical or obovate, obtuse or rounded and often abruptly short-acuminate at the apex, sericeous to glabrate at maturity above, densely and persistently rufous-sericeous below, the reticulum prominent above; petiole 20–33 mm long, sericeous; stipules 3–4 mm long, completely connate, abaxially sericeous, adaxially glabrous. Inflorescence with the flowers borne 1 per bract; bracts and bracteoles alike, very small, ca 0.5–1 mm long and wide, broadly triangular or rounded, persistent past maturity of the fruit; peduncle 0–0.5 mm long. Pedicel 8–10 mm long (–16 mm in fruit), straight in bud, nodding in fruit. Sepals all biglandular or all eglandular, abaxially densely sericeous, adaxially sparsely sericeous, especially proximally. Petals white or pink (probably white turning pink in age), abaxially densely sericeous. Anthers densely sericeous, with some hairs on the locules and many more on the connective between the locules and outside beside them; locules extended at the apex into long, tapered, distally sterile horns about equalling the connective; connective enlarged at the apex into a swollen, globular or elongated mass, larger in some anthers than others in the same flower. Ovary densely sericeous; all 3 locules fertile. Immature fruit ovoid, with an apical beak, thinly sericeous.

In 1935, Sandwith pointed out that the correct name for *Byrsonima altissima* *sensu* Niedenzu (1928) is *B. aerugo* Sagot. Not only is the epithet *altissima* illegitimate; its type was not the species for which Niedenzu used the name. However, Sandwith did not know which species was actually represented by Aublet's type. Kostermans did not understand the taxonomy of *Byrsonima* even as well as Sandwith, but he went ahead anyway and published the substitute name *B. aubletii*. When I was able to study Aublet's type in 1981, I discovered that the species is the one described in 1937 as *B. discolor* Pilger. The only difference between Aublet's collection and the others I have seen, which have all come from Pará or Maranhão, is that the latter have eglandular sepals while Aublet's specimen has all the sepals biglandular. The occurrence of eglandular forms is very common in *Byrsonima* species and does not merit taxonomic recognition.

Byrsonima aubletii is quite distinctive. Its anthers are those of Niedenzu's Section *Acrotheca* Subsection *Uroceras*. In that group this is the only species with the leaves densely and persistently sericeous below and the petals sericeous. In fact, this is the only species in the genus with densely hairy petals. In a few others (e.g. *B. maguirei*) the petals bear a few hairs, but in most the petals are glabrous. The brief description given above is intended to facilitate recognition of this rare and interesting plant, which is not described in Niedenzu's 1928 monograph.

HETEROPTERYS

These species, like those of *Byrsonima*, are presented here in approximately the order of their closest relatives in Niedenzu's monograph (1928).

Heteropterys actinoctenia W. R. Anderson, sp. nov.

Fig. 8.

Liana lignosa. Lamina foliorum majorum 7–10.5 cm longa, 3.5–4.2 cm lata, falcata, elliptica, apice acuminata, glabrata, subtus inter costam et marginem aliquot glandulis parvis munita; petiolus 6–9 mm longus, eglandulosus. Inflorescentia paniculata, 3–4 cm longa, ex 3–5 umbellis vel corymbis 3–8-floris constans; pedunculus 4–6 mm longus, apice vel saepius infra apicem bibracteolatus. Calycis glandulae 3.2–4 mm longae, obovatae, decurrentes. Nux samarae utrinque 4–8 alulis parallelis ex areola ventrali radiantibus munita.

Woody vine; stems sericeous to glabrate, with many punctiform lenticels. Lamina of the larger leaves 7–10.5 cm long, 3.5–4.2 cm wide, falcate, elliptical, acuminate at the apex, thin and \pm flat at the margin, rounded at the base, initially sericeous? quite glabrate at maturity, bearing on each side below a row of small (0.5 mm in diameter) crateriform glands approximately midway between midrib and margin, shiny above, the lateral veins and reticulum visible below, barely so above; petiole 6–9 mm long, glabrate or bearing scattered appressed hairs at maturity, eglandular; stipules not found. Inflorescence axillary and terminal, 3–4 cm long, a raceme of 3–5 short-stalked or sessile umbels or corymbs of 3–8 flowers each, tomentose-sericeous; floriferous bracts 1–1.5 mm long, triangular, concave, appressed, eglandular, persistent; peduncle 4–6 mm long; bracteoles like the bracts or smaller, one or both usually borne up to 1 mm below apex of peduncle. Pedicel 8 mm long (in fruit), tomentose-sericeous. Sepals (in fruit) triangular, flat (not revolute), 1.5–2 mm long, ca 2 mm wide, hardly exceeding the glands, abaxially tomentose, adaxially glabrous, the anterior eglandular, the lateral 4 bearing 8 large glands 3.2–4 mm long, obovate, compressed, somewhat decurrent onto pedicel. Petals and stamens unknown. Style stigmatic on the inner angle of the apex, briefly extended dorsally and rounded or obtuse. Samaras 30–40 mm long, brown-sericeous, especially proximally and toward abaxial edge of wing; dorsal wing 25–32 mm long, 12–16 mm wide, often with a rounded projection on adaxial edge near nut, the abaxial margin straight or slightly curved upward; nut ca 6 mm long and high, bearing on each side a series of 4–8 short parallel winglets oriented at right angles to margin of ventral areole, irregular in size and shape, the largest 2.5 mm wide, often alternating with much smaller outgrowths; ventral areole ovate, 3–4 mm high, 2–2.5 mm wide; pyramidal torus ca 2 mm high.

TYPE: PERU. Loreto: Prov. Maynas, upland forest remnant and adjacent scrub on white sand just past Quistococha, ca 200 m, 27 May 1978 fr, A. Gentry 22302 $\&$ N. Jaramillo (MICH, holotype).

Heteropterys actinoctenia resembles *H. cristata* Benth and *H. floridana* Cuatr. in its leaves and inflorescence, so I assume it will prove to have pink carinate or winged petals when it is found with flowers. It differs from both of them, and from all other species in the genus, in its samara, which bears on the nut a series of parallel winglets oriented at right angles to the margin of the ventral areole. The epithet *actinoctenia* refers to this "radiating comb"; it is the name Niedenzu gave to the section of *Banisteria* (*Banisteriopsis*) in which this kind of samara occurs. In other species of *Heteropterys* the nut of the samara is smooth-sided or bears on each side a single transverse winglet oriented parallel to the margin of the ventral areole. The samara of *H. cristata* and *H. floridana* is of the latter type. *Heteropterys actinoctenia* is also distinguished by its somewhat decurrent calyx glands and its relatively short peduncles and pedicels, which produce an inflorescence denser than that of its close relatives.



FIG. 8. *Heteropterys actinoctenia* and *H. marleneae*. a–e, *H. actinoctenia*: a) fruiting branch, $\times 0.5$; b) infructescence, $\times 1$; c) old flower after loss of samaras, with pedicel and part of peduncle, $\times 2.5$; d) tip of style, $\times 25$; e) base of samara, $\times 2$. f–i, *H. marleneae*: f) fruiting branch, $\times 0.5$; g) pseudo-raceme with 2 old flowers, $\times 2.5$; h) tip of style, $\times 25$; i) immature samara, $\times 10$. Drawn by Karin Douthit from the types.

Heteropterys Series **Rhodopetalis** Niedenzu Subseries **Stenostigma** Niedenzu

In his treatment of *Heteropterys* for Das Pflanzenreich, Niedenzu divided the pink-flowered species into two principal subseries, *Bradystigma* and *Stenostigma*, plus a third subseries for the Antillean species, *H. purpurea*. The most important difference between the first two lay in the stigmas, which are dorsiventrally compressed in two or all three styles in *Bradystigma*, laterally compressed in *Stenostigma*. Study of the species assigned to *Stenostigma* by Niedenzu has led me to remove the following species, for the reasons given:

H. rubiginosa Adr. Juss.: The type proves to have the styles of *Bradystigma*.

H. trichanthera Adr. Juss.: The petals are yellow.

H. machaerophora Nied.: Two of the three styles are dorsiventrally compressed as in *Bradystigma*.

H. martiana Adr. Juss.: The petals are yellow; this species is probably related to *H. syringifolia* Grisebach.

H. duseonii Nied.: The petals are yellow.

This leaves only *Heteropterys pteropetala* Adr. Juss. in *Stenostigma*. *H. pteropetala* is a widespread, polymorphic species that merits careful study, which will probably result in its division into several entities. I am not prepared to address that problem at this time, but there are two additional species of *Stenostigma* in eastern Brazil that seem to be distinct from *H. pteropetala*. They are described below.

Heteropterys caducibracteata W. R. Anderson, sp. nov.

Fig. 9.

Frutex usque ad 2 mm altus vel liana lignosa. Lamina foliorum majorum 3–4.8 cm longa, 1.6–2.5 cm lata, utrinque pertinaciter tomentosa, subtus 0, 1, vel 2 glandulas prope basim ferens; petiolus 3–4 mm longus, eglandulosus. Bracteae 1.8–2.5 mm longae, 0.4–0.5 mm latae, anguste triangulares vel ellipticae, eglandulosae, deciduae; bracteolae bracteis similes sed persistentes. Petala rosea et alba; petala lateralia dorsaliter alata, ala alba, pilosa, 0.6–1 mm lata; petalum posticum dorsaliter carinatum. Filamenta inaequalia, illa sepalis opposita plerumque longiora, illa petalis postico-lateralibus opposita crassissima, 3 postica inter stylos posticos inflexa; antherae 0.9–1.1 mm longae.

Shrub to 2 m tall or woody vine climbing to 4 m; stems to 3 cm in diameter, tomentose-sericeous, belatedly glabrescent. Lamina of the larger leaves 3–4.8 cm long, 1.6–2.5 cm wide, elliptical or ovate, acute or obtuse at the apex, flat at the margin, cuneate at the base, persistently tomentose or subvelutinous above with stalked, mostly T-shaped sinuous hairs, persistently densely tomentose below, bearing 0, 1, or 2 slightly peltate glands below near base between midrib and margin, the lateral veins prominent below, obscure above; petiole 3–4 mm long, appressed-tomentose, eglandular; stipules 0.2 mm long, triangular, borne on petiole above its base. Inflorescence paniculate, densely tomentose, the flowers borne in corymbs or dense racemes of 10–20 (or more?); bracts 1.8–2.5 mm long, 0.4–0.5 mm wide, narrowly triangular or elliptical, thin, abaxially densely tomentose, adaxially glabrous or sparsely tomentose, eglandular, deciduous late in anthesis; peduncle 5–7.5 mm long, densely tomentose; bracteoles like the bracts or slightly shorter, persistent (at least through anthesis; older stages not seen), borne at or slightly below apex of peduncle. Pedicel 2.5–4.5 mm long, densely tomentose. Flowers ca 12 mm in diameter. Sepals 1.5–2 mm long, 1–1.3 mm wide, triangular, obtuse at the apex, appressed in anthesis, abaxially densely and uniformly tomentose, adaxially glabrous, the anterior eglandular or bearing 1 or 2 glands, the lateral 4 all biglandular, the glands 1.2–1.6 mm long, pink. Petals pink with white wings, pilose especially on the wings; lateral petals

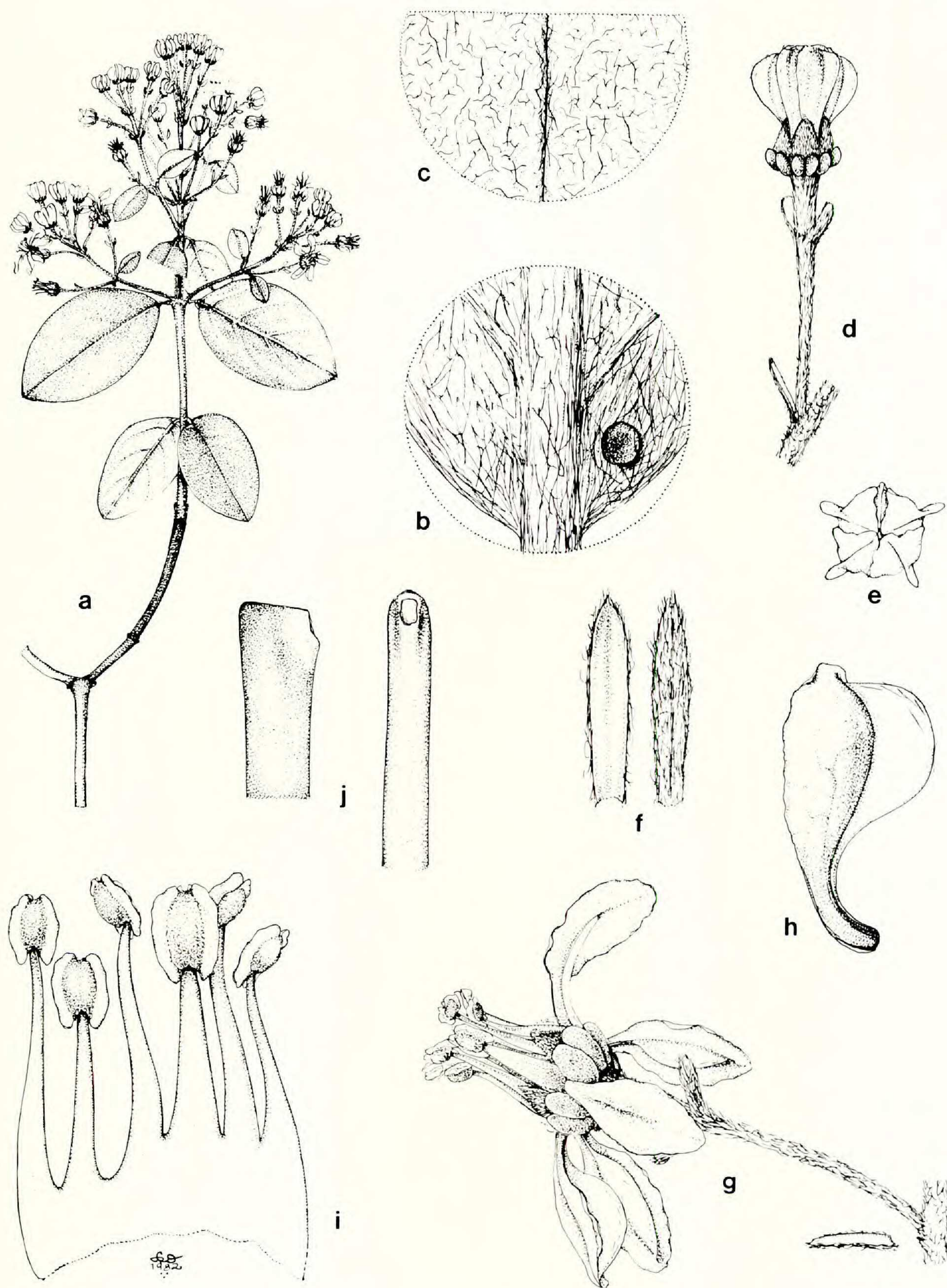


FIG. 9. *Heteropterys caducibracteata*. a) flowering branch, $\times 0.75$; b) lamina below, $\times 7.5$; c) lamina above, $\times 7.5$; d) flower bud, with pedicel and peduncle, $\times 3$; e) flower bud from above, $\times 3.75$; f) bracts, adaxial side left, abaxial side right, $\times 10$; g) flower, with pedicel, peduncle, and falling bract, $\times 4.5$; h) lateral petal, $\times 7.5$; i) partial androecium, flattened out, with stamen to right opposite posterior petal, $\times 10$; j) style tips, lateral view left, adaxial view right, $\times 30$. Drawn by Karin Douthit from the type.

spreading to reflexed, the winged claw 1.5–2 mm long, the limb 3.5–4.5 mm long, 2–2.3 mm wide, elliptical, entire or slightly erose, eglandular, bearing a prominent decurrent dorsal wing 0.6–1 mm wide; posterior petal erect with the limb reflexed, the claw 2.8–3.5 mm long, 1 mm wide, the limb 3.3–4 mm long, 2.3–2.7 mm wide, oblong, erose, eglandular, dorsally carinate with the keel 0.2 mm wide, decurrent. Filaments red in age, 2.2–3.5 mm long, connate in the basal 0.8–1 mm, glabrous, unequal, generally longer opposite sepals than petals, thickest opposite posterior-lateral petals, the posterior 3 inflexed; anthers glabrous, 0.9–1.1 mm long, subequal, largest opposite posterior-lateral petals. Ovary 1.5 mm high, densely sericeous; styles 1.7–2.2 mm long, equal or the anterior slightly shorter, \pm straight, somewhat divergent, flattened laterally, truncate dorsally at the apex, the stigma internal and elliptical. Fruit unknown.

TYPE: BRAZIL. Bahia: Caatinga between Breijão da Caatinga and Delfino (41°0–20' W, 10°25' S), sandy soil, 600 m, 9 km W of Breijão, 7 Mar 1976 fl, Anderson 11742 (MBM, holotype; MICH, isotype).

Heteropterys caducibracteata is named for its deciduous bracts, which fall late in anthesis, in contrast to the persistent bracts of the other species of *Stenostigma*. The bracts and bracteoles are also unusual in their narrowly elliptical shape and thin texture. The leaves in this species are smaller than in *H. perplexa* and *H. pteropetala sens. lat.*, in which the larger laminas are at least 6 cm wide, and usually quite a bit larger.

Heteropterys perplexa W. R. Anderson, sp. nov.

Fig. 10.

Liana lignosa. Lamina foliorum majorum 6.5–13.5 cm longa, 3.8–8 cm lata, ovata vel elliptica, subtus pertinaciter subvelutina et 2 magnis glandulis prope basim munita; petiolus 5–6 mm longus, eglandulosus. Bracteae bracteolaeque persistentes; pedunculus 5–9 mm longus. Pedicellus 3–5.5 mm longus. Sepala abaxialiter sericea. Petala limbo albo et roseo, ungue rubro; petala lateralia dorsaliter alata, ala 1.2–2.5 mm lata; petalum posticum dorsaliter carinatum, carina 0.1–0.3 mm lata. Filamenta rubra, valde inaequalia, illa petalis anticolateralibus opposita brevissima, illa petalis postico-lateralibus opposita crassissima, 3 postica inter stylos posticos inflexa.

Woody vine climbing to 10 m; stems densely appressed-tomentose or subsericeous, eventually glabrescent. Lamina of the larger leaves 6.5–13.5 cm long, 3.8–8 cm wide, ovate or elliptical, acute or slightly acuminate at the apex, flat at the margin, broadly cuneate to rounded at the base, appressed-tomentose to glabrate above, persistently subvelutinous below with T-shaped hairs with the trabecula much longer than the stalk and straight or sinuous, bearing 2 large, often swollen or slightly peltate glands abaxially above the base, on the midrib or on a lateral vein between midrib and margin, the lateral veins and coarse reticulum prominent below, impressed above; petiole 5–6 mm long, appressed-tomentose to glabrescent, eglandular; stipules 0.2 mm long, borne on the petiole just above its base. Inflorescence paniculate with widely spreading branches, densely tomentose, containing reduced leaves with 2 large protuberant and sometimes short-stalked glands, the flowers borne in umbels or tight corymbs of 4–15; bracts 1.3–1.8 mm long, 0.6–1 mm wide, triangular or ovate, abaxially densely and uniformly tomentose, adaxially glabrous, appressed, eglandular, persistent (at last while peduncle persists); peduncle 5–9 mm long, densely tomentose; bracteoles 1–1.5 mm long, 0.8–1 mm wide, triangular or ovate, abaxially tomentose in center and glabrate and membranous toward margin, adaxially glabrous, spreading, usually bearing 2 small marginal glands or glandular spots near the base, persistent, borne at or just below apex of peduncle. Pedicel 3–

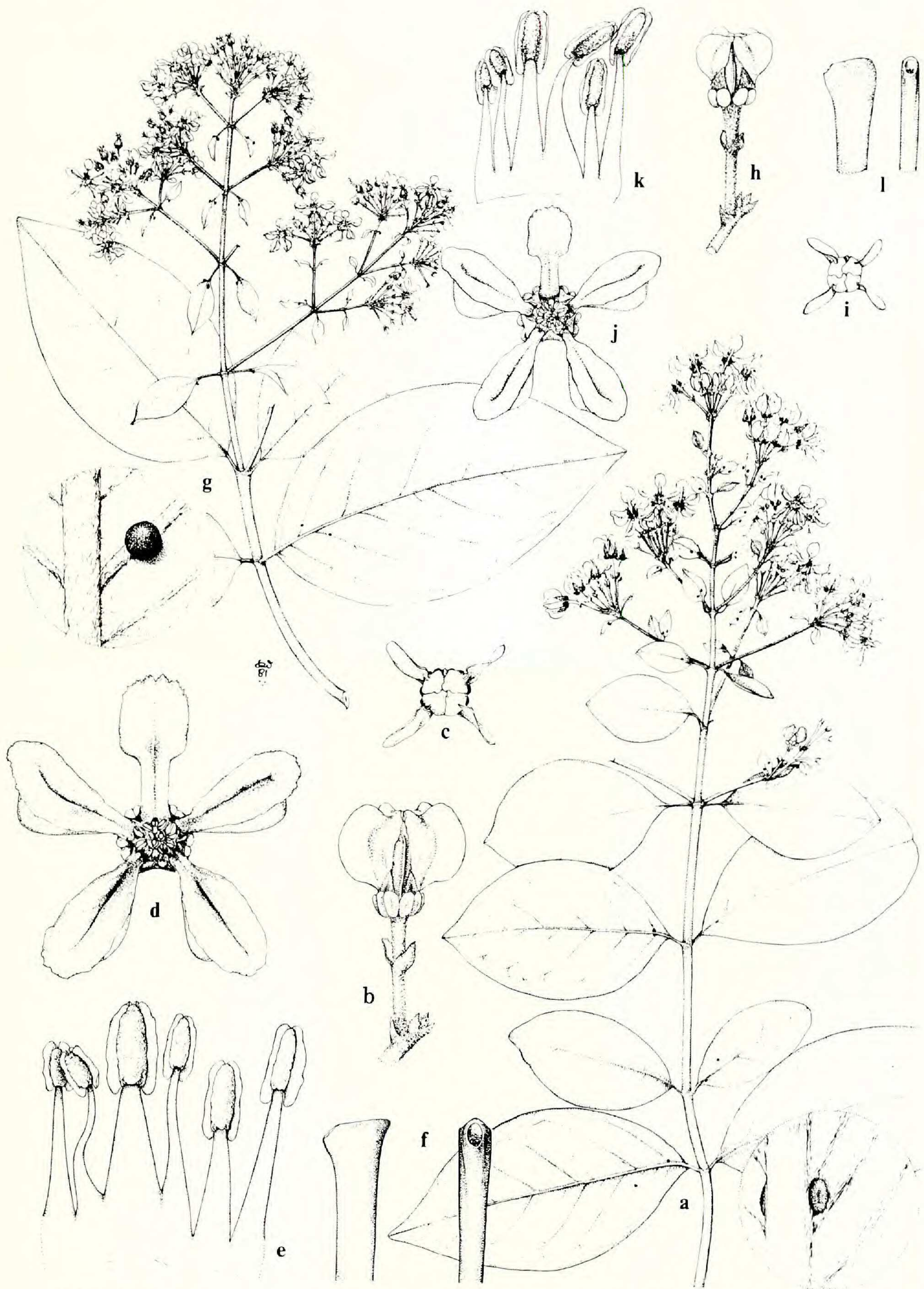


FIG. 10. *Heteropterys perplexa*. a, g) flowering branches, $\times 0.5$, with circles $\times 7.5$; b, h) flower buds with pedicel and peduncle, $\times 2$; c, i) flower buds from above, $\times 2.5$; d, j) flowers from above, $\times 3$; e, k) partial androecia, flattened out, with stamen to left opposite posterior petal, $\times 7.5$; f, l) style tips, lateral view left, adaxial view right, $\times 20$. Drawn by Karin Douthit, a-f from *Anderson 11749*, g-l from *Irwin et al. 23203*.

5.5 mm long, densely tomentose. Flowers 10–16 mm in diameter. Sepals 1.5–2 mm long, 1–2 mm wide, triangular, acute or obtuse at the apex, appressed in anthesis, abaxially uniformly sericeous or glabrous at the margin, adaxially glabrous, the anterior eglandular, the lateral 4 bearing 8 glands 1.3–2 mm long. Petals white on the margins, pink in the center, and red in the claw, glabrous or sparsely pilose on edge of wing; lateral petals spreading, the winged claw 1.1–2 mm long, the limb 3–5.5 mm long, 2–3.3 mm wide, elliptical, entire, eglandular, bearing a prominent dorsal wing 1.2–2.5 mm wide; posterior petal erect with the limb somewhat reflexed, the claw 2–3 mm long, 1–1.4 mm wide, the limb 2.3–3.5 mm long and wide, irregularly rectangular, revolute, slightly erose, eglandular, dorsally carinate with the keel 0.1–0.3 mm wide, decurrent. Filaments red, 1.5–3.5 mm long, connate in the basal 0.5–1 mm, glabrous, strongly unequal, shortest opposite anterior-lateral petals, thickest opposite posterior-lateral petals, the posterior 3 bent inward between the 2 posterior styles; anthers glabrous, unequal, 0.9–1.8 mm long, shortest opposite the 4 lateral sepals and the posterior petal. Ovary 1–1.5 mm high, densely sericeous; styles 2–3 mm long, glabrous, straight and erect or divergent or leaning toward posterior petal, flattened laterally, rounded or truncate or apiculate dorsally at the apex, the stigma internal and elliptical. Fruit unknown.

TYPE: BRAZIL. Bahia: Caatinga 10–20 km W of Delfino on road from Lagoinha to Campo Largo, 41°20' W, 10°27' S, 650–750 m, 8 Mar 1976 fl, *Anderson 11749* (MBM, holotype; K, MICH, NY, RB, US, isotypes).

PARATYPES: BRAZIL. Bahia: 8 km NW of Lagoinha, 5.5 km SW of Delfino, on road to Minas do Mimoso, caatinga/cerrado, frequently burned and cut over, ca 850 m, ca 41°17' W, 10°24' S, Mar fl, *Harley 16775* (MICH). Minas Gerais: Serra do Espinhaço, wooded valley slopes, ca 5 km NE of Francisco Sá, road to Salinas, 950 m, Feb fl, *Irwin et al. 23203* (MICH, NY, UB).

I originally intended to describe this as two species, one based on *Anderson 11749*, the other on *Irwin et al. 23203*. They have flowers that are dramatically different in size, with petal-wings 2–2.5 mm wide vs. 1.2–1.5 mm wide, respectively, and longest filaments 3–3.5 mm long vs. 2.5 mm. Figure 10 was drawn to illustrate those and other differences. Then I realized that *Harley 16775* is generally similar to my *11749* and came from the same area, but has flowers that are somewhat intermediate in size, especially in the petal-wings, which are 1.5–1.7 mm wide. Since the three collections are similar in most vegetative features, it seems best to treat them as one species, at least for the present. Perhaps when more collections are available it will become possible to achieve a finer resolution of this perplexing situation.

The only character that reliably separates this species from *H. pteropetala* Adr. Juss. *sensu lato* is habit. *Heteropterys perplexa* is a woody vine, while *H. pteropetala* is an erect subshrub, shrub, or small tree. The common form of *H. pteropetala* differs further in having larger suborbicular leaves with denser hairs below. As noted above, *H. pteropetala* requires thorough study.

Heteropterys krapovickasii W. R. Anderson, sp. nov.

Fig. 11.

Liana lignosa. Lamina foliorum majorum 7.5–10.5 cm longa, 3.5–5.1 cm lata, eglandulosa, subtus pertinaciter metallo-sericea; petiolus 7–13 mm longus, 2 glandulas magnas inter medium et apicem ferens. Inflorescentia paniculata, foliis minoribus petiolo vel basi laminae biglandulosis et saepe margine laminae aliquot glandulis minoribus munitis; flores in umbellis vel corymbis (2–) 4–8-floris portati, saepe 1–2 paribus proximalibus adjectis; bracteolae plerumque prope medium pedunculi portatae. Petala flava, ungue 1.3–2.4 mm longo, limbo 3–4 mm longo, 2.3–3 lato. Filamenta 1.7–2.5 mm longa, recta; antherae 1–

1.1 mm longae, glabrae. Styli recti. Samara 23–30 mm longa; ala dorsalis 13–15 mm lata, flabelliformis.

Woody vine, the stems puberulent to glabrate. Lamina of the larger leaves 7.5–10.5 cm long, 3.5–5.1 cm wide, elliptical or slightly obovate, obtuse, rounded, or emarginate and often apiculate at the apex, flat or slightly recurved at the margin, cuneate or obtuse at the base, eglandular (but see inflorescence leaves), initially sericeous above but soon glabrate or persistently sericeous on the midrib, very densely and persistently metallic-sericeous below, the hairs both brown and white, sometimes abraded from oldest leaves, the lateral veins prominent below, the reticulum visible above; petiole 7–13 mm long, sericeous to glabrate, bearing 2 large glands between middle and apex; stipules not found. Inflorescence

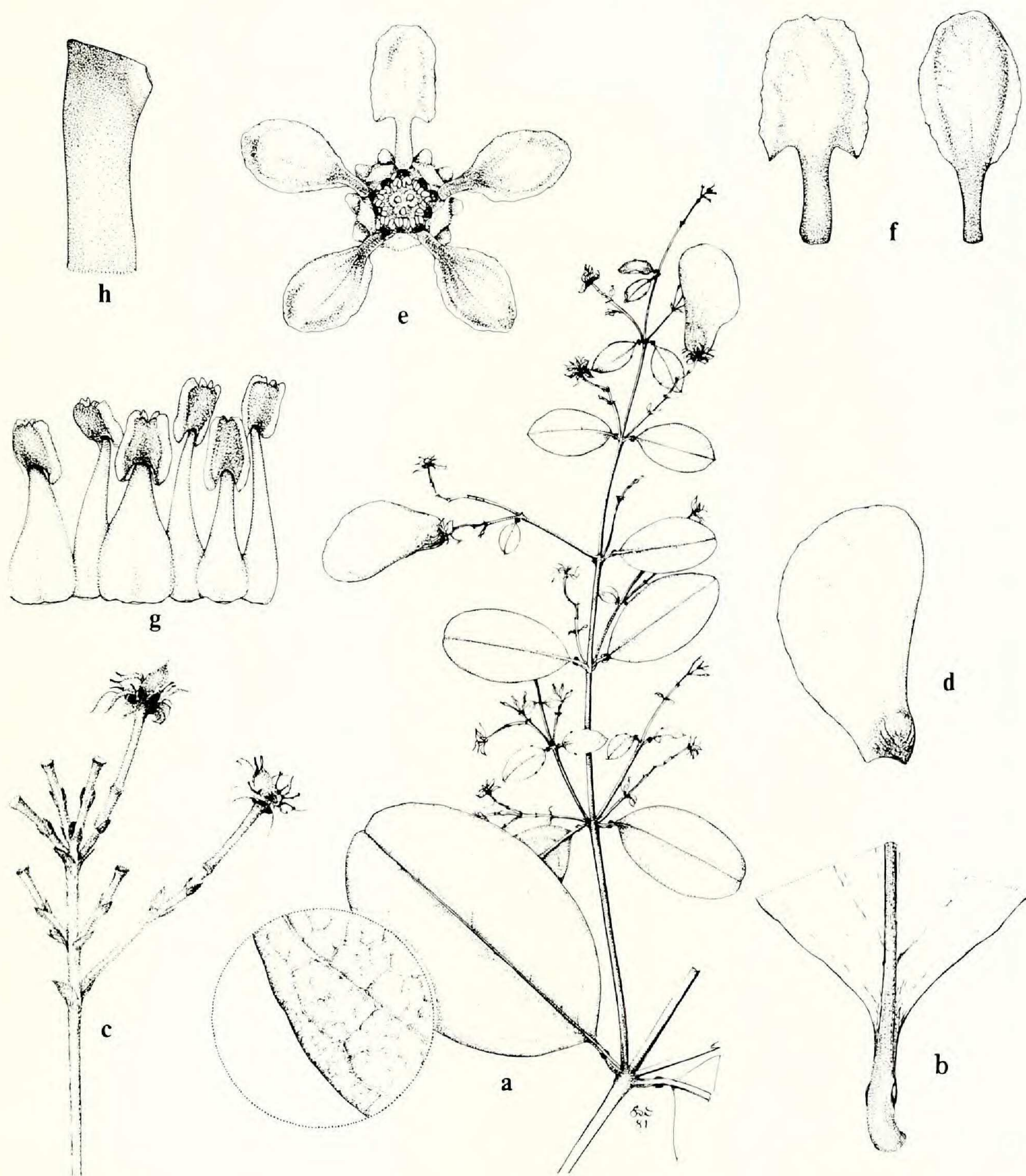


FIG. 11. *Heteropterys krapovickasii*. a) fruiting branch, $\times 0.55$, circle \times ca 2.8; b) base of leaf, abaxial side, $\times 1.65$; c) portion of inflorescence in fruit, $\times 2.2$; d) samara, $\times 1.1$; e) flower, $\times 3.85$; f) petals, posterior petal left, lateral petal right, $\times 5.5$; g) portion of androecium, opened out, abaxial view, stamen to left opposite posterior petal, $\times 8.25$; h) tip of style, side view, $\times 22$. Drawn by Karin Douthit, a–d from Pires & Santos 16372, e–h from Krapovickas & Schinini 36259.

paniculate, subvelutinous or appressed-tomentose, containing abruptly reduced leaves with large glands on petiole or base of lamina and often several smaller glands distally on margin of lamina; flowers borne ultimately in umbels or corymbs of (2-) 4-8 flowers, often with 1 or 2 additional pairs of flowers borne more proximally; bracts 0.9-1.2 mm long, 0.5-0.8 mm wide, ovate, appressed, abaxially sericeous, adaxially glabrous, eglandular, persistent; peduncle (1.5-) 2.5-4 mm long; bracteoles like the bracts but slightly shorter (0.7-1 mm long), borne mostly near middle of peduncle, sometimes somewhat above or below. Pedicel 3-5.5 mm long, appressed-tomentose. Flowers 10-11 mm in diameter. Sepals 2-2.5 mm long, 1.5-1.7 mm wide, triangular or ovate, obtuse or rounded at the apex, appressed in anthesis, abaxially sericeous, adaxially glabrous, all eglandular or the lateral 4 bearing 7-8 glands 1.1-1.4 mm long, elliptical, separated on the sepals. Petals yellow, glabrous, eglandular, nearly entire (minutely denticulate or erose); lateral petals horizontal, \pm spatulate, with the claw 1.3-1.7 mm long, the limb 3-4 mm long, 2.3-3 mm wide, ovate or broadly elliptical, somewhat concave; posterior petal apparently erect, hardly different in size and shape from the lateral 4, the claw 2-2.4 mm long, the limb 3 mm long, 2.3-2.5 mm wide, truncate at the base. Filaments 1.7-2.5 mm long, mostly shorter and stouter opposite petals than sepals, straight, glabrous, basally connate; anthers 1-1.1 mm long, alike, glabrous. Ovary 1 mm high, densely sericeous; styles 2.2 mm long, straight and \pm erect, equalling or slightly exceeding the anthers, truncate and acute or slightly apiculate dorsally at the apex. Samaras 23-30 mm long, sparsely sericeous; dorsal wing 23-30 mm long, 13-15 mm wide, extending over the adaxial edge of the nut, much flared distally to produce a flabellate shape, the abaxial margin nearly straight; nut 6 mm long, 5 mm high, with prominent parallel longitudinal wrinkles (dried) but no lateral crests or wings; ventral areole circular, 1.5-2 mm in diameter.

TYPE: BOLIVIA. Santa Cruz: Prov. Sandoval, San Matías (58°26' W, 16°21' S), 5 km SW del Aeropuerto, 170 m, 19 Apr 1980 fl, *Krapovickas* & *Schinini* 36259 (MICH, holotype; CTES, NY, isotypes).

PARATYPE: BRAZIL. Mato Grosso: 57°50' W, 14°48' S, capoeira de mata seca, Aug fr, *Pires* & *Santos* 16372 (MICH, MG).

This species is named in honor of my friend, Antonio Krapovickas, a fine botanist who specializes in the systematics of the Malvaceae.

Heteropterys krapovickasii is closely related to *H. hassleriana* Nied., from which it differs chiefly in having the hairs on the abaxial side of the lamina very dense, straight, sessile, appressed, and persistent, producing a metallic-sericeous vesture. In *H. hassleriana* the hairs are sparser and less appressed and the leaf is usually soon glabrate. Also, in *H. hassleriana* the samara wing is not or hardly flared distally, so that the two edges of the wing are nearly parallel. Both of these species are probably closely related to the larger-flowered *H. tomentosa*, although Niedenzu placed *H. tomentosa* and *H. hassleriana* in different subsections.

Heteropterys sincorensis W. R. Anderson, sp. nov.

Fig. 12.

Frutex vel arbor parva usque ad 3 (-4) m alta. Lamina foliorum majorum (5-) 6-10 cm longa, 4.5-6.5 cm lata, coriacea, late ovata vel elliptica vel sub-orbicularis, apice rotundata et interdum apiculata vel emarginata, basi rotundata vel cordata, mox glabrata, basi margine 2 glandulas magnas impressas et interdum distaliter aliquot glandulas minores marginales ferens; petiolus 2-4 mm longus, eglandulosus. Pedunculus (1.5-) 4-7 mm longus, apice bibracteolatus. Sepala appressa, plerumque omnia biglandulifera, glandulis sericeis. Petala flava, abaxialiter rubra in centro, denticulata; petalum posticum limbo basi glanduloso. Androecium glabrum. Styli apice truncati vel interdum apiculati.

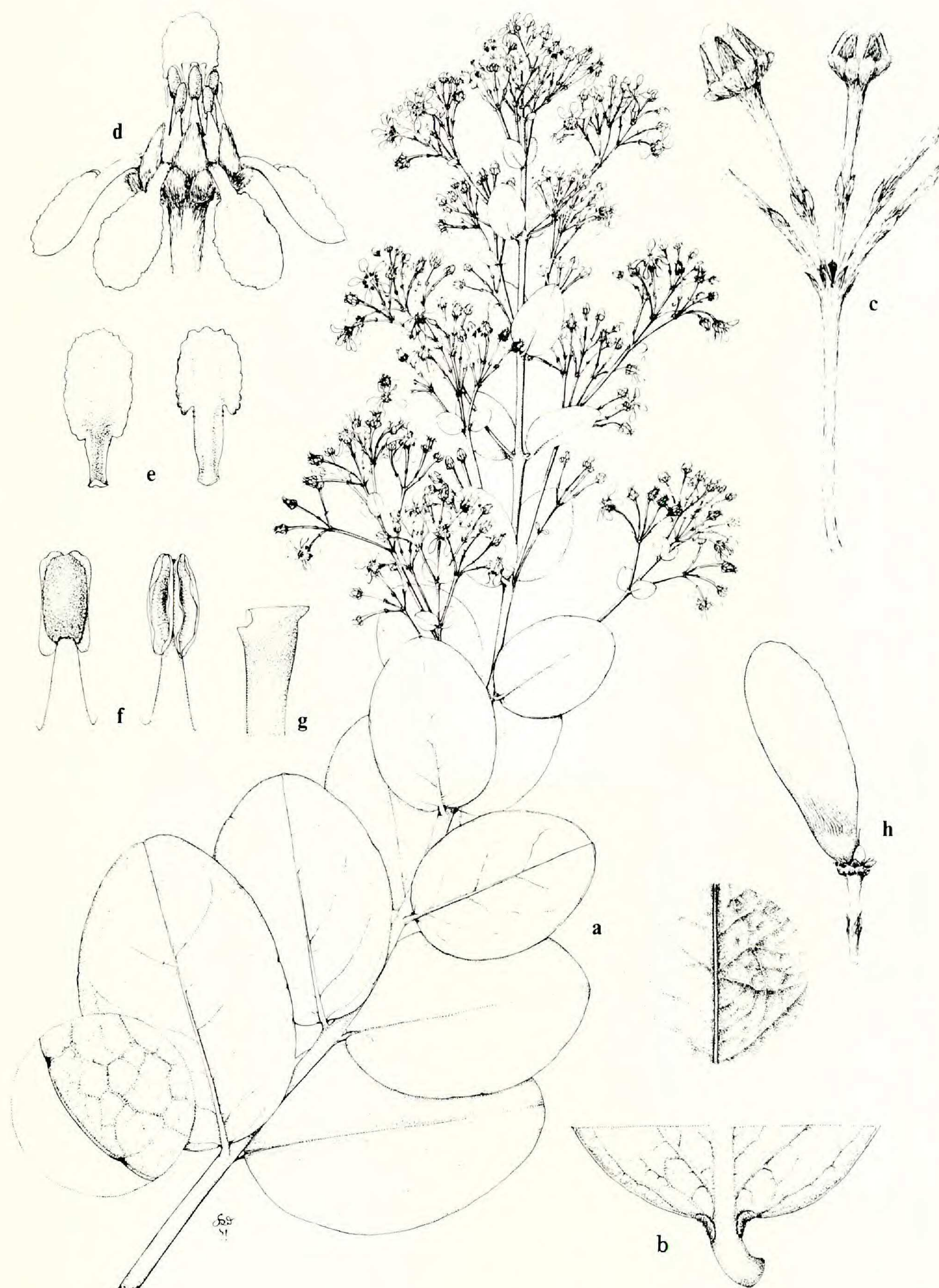


FIG. 12. *Heteropterys sincorensis*. a) flowering branch, $\times 0.5$, with leaf below enlarged in circle to left and upper surface in circle to right, both \times ca 2.5; b) base of leaf, abaxial view, $\times 3$; c) umbel, $\times 2.5$; d) flower, $\times 3.5$; e) petals, abaxial view, anterior-lateral (left) and posterior (right), $\times 3.5$; f) anthers, abaxial view (left) and adaxial view (right), $\times 10$; g) style-tip, $\times 20$; h) samara borne on receptacle, $\times 1$. Drawn by Karin Douthit, a-g from *Harley 18821*, h from *Mori et al. 12635*.

Samarae ala dorsalis 23–27 mm longa, 11–14 mm lata, nux sine cristis lateralibus.

Shrub or small tree up to 3 (–4) m tall; stems loosely sericeous, soon glabrescent. Lamina of the larger leaves (5–) 6–10 cm long, 4.5–6.5 cm wide, broadly ovate or elliptical to suborbicular, rounded and sometimes apiculate or emarginate at the apex, slightly revolute at the margin, rounded or cordate at the base, coriaceous, at first sparsely sericeous but soon glabrate, bearing 2 large impressed marginal glands at base of blade or halfway onto petiole and often additional smaller glands distally in marginal sinuses, the lateral veins and coarse reticulum prominent below, the fine reticulum prominent above; petiole 2–4 mm long, thick, loosely sericeous to glabrate, eglandular except for the often decurrent glands at base of lamina; stipules often present on petioles of small inflorescence-leaves as minute (0.1–0.2 mm long) protuberances borne on petiole above base, apparently absent from larger leaves. Inflorescence a much-branched, many-flowered panicle containing abruptly reduced leaves, the ultimate branches sometimes racemose but usually corymbose or umbellate comprising 4–10 or more flowers, loosely sericeous; bracts and bracteoles 1–2 mm long, 0.5–1 mm wide, elliptical or obovate, rounded at the apex, appressed, persistent, the bracteoles borne at apex of peduncle, usually bearing 2 tiny marginal glands at the base; peduncle (1.5–) 4–7 mm long. Pedicel 5–10 mm long, loosely sericeous. Flowers 11–13 mm in diameter, “very sickly scented” (*Harley 15981*). Sepals 1.6–2 mm long, 1.2–1.5 mm wide, ovate or triangular, acute or obtuse at the apex, appressed in anthesis, abaxially sericeous, adaxially glabrous, all biglandular or (in 1 collection) the anterior eglandular, the glands 1.5–2.5 mm long, obovate, densely sericeous, attached below free portion of sepal. Petals yellow with red abaxial streak, turning orange-red in age, glabrous; lateral petals spreading to eventually strongly reflexed, with the claw 1–1.8 mm long, winged, the limb 3.5–4.5 mm long, 2–3 wide, oblong or obovate, denticulate and eglandular at the margin, thickened and slightly carinate in the middle; posterior petal with the claw 1.5–2.3 mm long, thick and winged, erect, the limb 3–3.5 mm long, 2.3–3 mm wide, reflexed, similar to lateral petals but with glandular zones or discrete glands at the base. Filaments 1.5–2.5 mm long, longer opposite sepals than petals, erect and straight, connate in the proximal 0.7–1.3 mm, glabrous; anthers 1–1.4 mm long, glabrous, subequal. Ovary ca 1.5 mm high, densely sericeous; styles 1.5–2 mm long, glabrous, alike, erect to eventually divergent with the anterior bending back toward the anterior sepal and the posterior 2 bending toward the posterior petal, equalling or slightly exceeding the anthers, truncate at the apex, sometimes minutely apiculate dorsally. Samaras 30–35 mm long, borne quite erect when single, suberect when 2 develop, reddish purple (dried), sparsely and loosely sericeous; dorsal wing 23–27 mm long, 11–14 mm wide, the abaxial margin nearly straight; nut 6–7 mm long, 4–5 mm high, with prominent veins but no lateral crests or wings; ventral areole ovate or circular, ca 3 mm in diameter; torus ca 2.5 mm high.

TYPE: BRAZIL. Bahia: Serra do Sincorá, by Rio Cumbuca ca 3 km S of Mucugé, near site of small dam on road to Cascavel, approx. 41°21' W, 13°01' S, 850 m, 4 Feb 1974 fl, *Harley 15981* (CEPEC, holotype; MICH, isotype).

PARATYPES: BRAZIL. Bahia, Serra do Sincorá: 5 km S of Andaraí on road to Mucugé, by bridge of Rio Paraguaçu, 41°19' W, 12°50' S, ca 400 m, Feb fl, *Harley 18587* (MICH); 2–3 km SW of Mucugé on road to Cascavel, open scrub on white sand, 41°24' W, 13°01' S, ca 950 m, Feb fl, *Harley 18821* (MICH); 6.5 km SW of Mucugé on Cascavel road, sandstone rock and sandy soils, 41°25' W, 13°01' S, ca 1000 m, Mar fl, *Harley 21019* (MICH); Mpio de Mucujê, na estrada para Jussiape, 41°24' W, 13°00' S, 1000 m, campo rupestre, Jul fr, *Mori et al. 12635* (MICH, US).

This distinctive species is notable for its arborescent habit, glabrate coriaceous leaves with marginal glands and short petioles, umbels or corymbs of pedunculate flowers, hairy calyx glands, oblong yellow petals with a red abaxial streak, and the flag petal with glands at the base of the limb. It is probably most similar to *Heteropterys bahiensis* Nied., known only from the type, which I have not seen. The photograph of the specimen at G (F neg. 24258) shows it to have relatively long, narrowly elliptical leaves, cuneate at the base, with slender, well developed petioles. When *H. bahiensis* is collected with good flowers and fruits, further differences from *H. sincorensis* will surely be found. *Heteropterys sincorensis* is known only from the Serra do Sincorá, for which it is named; the place of origin of Blanchet's type of *H. bahiensis* is not known. Other species in this complex are *H. megaptera* Adr. Juss., from Rio de Janeiro, and *H. lasseri* Anderson, from Venezuela.

Heteropterys conformis W. R. Anderson, sp. nov.

Fig. 13.

Liana lignosa, ramis mox glabratis. Lamina foliorum majorum 5.5–9.5 (–12.5) cm longa, 3–4.5 (–5.7) cm lata, margine tenuis, primo sericea permo omnino glabrata, reticulo utrinque ± prominenti; petiolus 7–15 mm longus, basi biglandulosus. Inflorescentiae axillares et terminales, 1.5–4 cm longae, floribus congestis. Pedicellus 4–7 mm longus, 0.3–0.4 mm diametro, sessilis. Sepala appressa per anthesin, eglandulosa. Petala flava, valde reflexa, limbo 2–2.5 mm longo, 1.8–2.3 mm lato. Styli angulo interno stigmatici.

Woody vine; stems initially sericeous, soon glabrate. Lamina of the larger leaves 5.5–9.5 (–12.5) cm long, 3–4.5 (–5.7) cm wide, elliptical, rounded, obtuse, or acute at the apex, sometimes emarginate or abruptly short-acuminate, thin and slightly revolute at the margin, cuneate to rounded at the base, initially sericeous but very soon quite glabrate, eglandular or (*Glaziou 13608*) bearing several small glands on or just within the margin, the lateral veins and reticulum prominent on both sides; petiole 7–15 mm long, sericeous to soon glabrate, biglandular at or just above the base, the glands circular, slightly raised, 0.7–1.3 mm in diameter; stipules not found. Inflorescence a series of dense axillary and terminal clusters, borne among current leaves, each unit 1.5–4 cm long, sericeous, a raceme of sessile and stalked umbels of 2–6 flowers with some flowers borne singly on the axis; bracts and bracteoles 0.5–1 mm long, narrowly ovate or triangular, eglandular, persistent; floriferous peduncle none. Pedicel 4–7 mm long, 0.3–0.4 mm in diameter, sericeous. Flowers 6–8 mm in diameter. Sepals 2–2.5 mm long, 0.9–1.5 mm wide, ovate or elliptical, rounded at the apex, appressed in anthesis, abaxially loosely sericeous, adaxially glabrous, all eglandular. Petals yellow, glabrous; lateral petals soon strongly reflexed, the claw 1.2–1.8 mm long, the limb 2–2.5 mm long, 1.8–2.3 mm wide, ovate, concave, denticulate, eglandular; posterior petal hardly different from the lateral 4, the limb or limb and claw strongly reflexed, the claw 1.5–2.5 mm long, the limb 2–2.5 mm long, 2 mm wide, ovate, bearing tiny glandular-thickened zones at the base or tiny sessile glands around the margin. Filaments 1.5–2 mm long, connate in the proximal 0.5–0.7 mm, strongly unequal, stoutest and straightest opposite the 2 posterior-lateral petals, the posterior 3 bent inward, glabrous; anthers 0.8–1.2 mm long, largest opposite posterior-lateral petals, glabrous, the connective dark red to black. Ovary 1–1.3 mm high, tomentose; styles 1.7–2.2 mm long, equalling or slightly exceeding the stamens, glabrous, nearly straight to somewhat arcuate, laterally flattened, truncate at the apex or dorsally acute, stigmatic on the inner angle. Fruit unknown.

TYPE: BRAZIL. Bahia: Itajú do Colônia a 25 km da estrada Itajú–Pau Brasil, solo pedregoso em capim, 23 Jan 1969 fl, *T. S. Santos 346* (CEPEC, holotype; MICH, isotype).



FIG. 13. *Heteropterys conformis* and *H. sanctorum*. a–f, *H. conformis*: a) flowering branch, $\times 0.5$, circles $\times 2.5$; b) petiole, $\times 2.5$; c) portion of inflorescence, $\times 3.5$; d) flower, $\times 5$; e) androecium, stretched out, abaxial view, with stamen to left opposite anterior sepal, $\times 10$; f) gynoecium, $\times 7.5$. g–m, *H. sanctorum*: g) leaf, abaxial view, $\times 0.5$, circle $\times 2.5$; h) inflorescence on old stem, $\times 0.5$; i) portion of inflorescence, $\times 2.5$; j) flower, $\times 5$; k) portion of androecium, $\times 5$; l) gynoecium, anterior style to left, $\times 7.5$; m) style-tip, $\times 25$. Drawn by Karin Douthit from the types.

PARATYPES: BRAZIL. Minas Gerais: Biribiry, près de Diamantina, 1882, *Glaziou 12491* (C, G, P); Rio Manso, *Glaziou 13608* p.p. (P).

I doubt that either of the paratypes actually came from Minas Gerais. For some reason, Glaziou falsified the label data for many of his collections, ascribing to Rio de Janeiro or Minas Gerais plants that very probably came from Bahia or farther north. *Glaziou 18925a*, the type of *Byrsonima glazioviana* Nied., is *B. crispa* Adr. Juss. and surely came from Bahia or north, not Minas Gerais. Another example is *Glaziou 9680*, which is *Peixotoa jussieuana* Adr. Juss.; Glaziou said it came from Rio de Janeiro, whereas it probably came from Maranhão, Piauí, or Ceará (C. Anderson, pers. comm.).

This species, and the next two, belong to the series *Holopetalum*, which I would define as comprising species with appressed sepals, yellow petals, sessile pedicels, and the lamina not persistently metallic-sericeous below. *Heteropterys conformis* is quite similar to *H. ternstroemiifolia*, and the epithet chosen denotes that similarity. The two species can be distinguished by the characteristics summarized in the following couplet:

- Inflorescence axillary and terminal, 1.5–4 cm long, the flowers densely crowded; calyx eglandular; lamina initially sericeous but very soon quite glabrate, the margin thin, the reticulum ± prominent below; limb of petals 2–2.3 mm long, 1.8–2.3 mm wide; stigmas strongly internal. *H. conformis*.
- Inflorescence terminal, 2–14 cm long, open; calyx bearing 8 glands on the 4 lateral sepals; lamina initially densely tomentose, usually glabrate at maturity, the margin thickened and cordlike, the reticulum invisible below; limb of petals 3–4.5 mm long, 2.5–3 mm wide; stigmas terminal or subterminal. *H. ternstroemiifolia*.

Heteropterys ternstroemiifolia Adr. Juss., Ann. Sci. Nat. 2° Sér. Bot. 13: 274. 1840. Type: *Martius 116*, “in sylvis caeduis ad latera montium prope Sebastianopolim et Mandiocca,” Rio de Janeiro, Brazil (M! holotype; M! probable isotype, P! isotype).

Banisteria fischeriana Regel & Koernicke, Ind. sem. horti Petrop. 48. 1858. Type: *Riedel 173*, Corcovado, Rio de Janeiro, Brazil, Jan 1832 fl (LE! lectotype; GH! LE! U! W! isolectotypes or isosyntypes).

Banisteria ternstroemiifolia (Adr. Juss.) Nied., Verz. Vorles. Ak. Braunsberg 1912–1913: 14. 1912.

Woody vine, the stems sericeous to glabrate, longitudinally fissured and bearing punctiform lenticels in age, occasionally rooting at the nodes. Lamina of the larger leaves 6.5–13 cm long, 2–6 cm wide, elliptical or obovate, cuneate or occasionally rounded at the base, thickened and cordlike at the margin and sometimes corrugated, acute to rounded and often apiculate and retuse at the apex, initially densely rusty-tomentose on both sides, soon glabrescent, usually nearly or quite glabrate at maturity and often shining above, eglandular, the lateral veins and reticulum obscure or prominulous above, obscure below; petiole 8–15 (–20) mm long, appressed-tomentose to glabrate, biglandular at the base, the glands circular, 0.5–1.5 mm in diameter; stipules subulate, ca 0.5 mm long, borne at base of petiole just below glands. Inflorescence 2–14 cm long, open, loosely sericeous to glabrate, terminal, simple or occasionally basally ternate, a raceme of sessile or stalked umbels or corymbs of 2–6 flowers each, the umbels often subtended by biglandular bracts; floriferous bracts 0.7–1 (–1.5) mm long, triangular, eglandular, persistent; peduncle none; bracteoles like the bracts but smaller, usually ca 0.5 mm long. Pedicel 4–10 mm long, loosely sericeous, tumid at the apex, thickening in fruit, especially toward the apex. Sepals 2–3.5 mm long, 1.5–2 mm wide, ovate, acute or rounded at the

apex, appressed in anthesis, abaxially loosely sericeous, adaxially glabrous or sericeous at the margin, the anterior eglandular, the lateral 4 bearing 8 elliptical glands, the glands 1.4–2.5 mm long, free and sometimes revolute at the apex, not compressed. Petals yellow, glabrous, all 5 very strongly reflexed [flipped completely back] in anthesis, the claw 1.5–1.7 mm long, the limb 3–4.5 mm long, 2.5–3 mm wide, obovate, convex in center, revolute at margin, the margin eglandular, erose or denticulate; posterior petal hardly different from the lateral 4, the limb slightly longer. Filaments 2–3 mm long, alike, straight, connate for about $\frac{1}{2}$ their length, glabrous on both sides; anthers 1–1.6 mm long, alike, glabrous, erect to reflexed. Ovary 1.5 mm high, reddish-tomentose, 3-lobed, all 3 locules fertile; styles 1.5–1.8 mm long, equalling or slightly exceeding the stamens, glabrous, straight, diverging from each other, truncate at the apex, stigmatic on the apex or on the oblique inner angle. Samara 38–45 mm long, sparsely tomentose on the nut at maturity, otherwise glabrate; dorsal wing 25–31 mm long, 15–18 mm wide, extending over the adaxial side of the nut, the abaxial margin bent abruptly upward beyond the nut; nut 12–15 mm long, 7–10 mm high, the sides bulging and without winglets or crests, the veins prominent, the ventral aerole ovate to circular, 5 mm high, 4 mm wide.

BRAZIL. Rio de Janeiro: 1832 fl, *Ackermann* (BR); 1851 fl, *Andersson* (S); 1847 fl, *Forssell III* (S); Copacabana, 29 Oct 1867, *Glaziou 2116* (BR, C, P); Corcovado loco umbroso, 15 Sep 1874 fr, *Mosén 2441* (S); Copacabana, Aug 1862 fr, *Nadeaud* (P).

This species is endemic to the immediate area of Rio de Janeiro. I have described it in full here because Niedenzu's description, under *Banisteria*, is inadequate. I have seen no collection made more recently than 1874, which makes me fear that the species is extinct. However, perhaps it is hiding in some "loco umbroso" at the foot of Corcovado.

Heteropterys sanctorum W. R. Anderson, sp. nov.

Fig. 13.

Liana lignosa. Lamina foliorum majorum 18–25 cm longa, 8–11 cm lata, subtus pertinaciter sparsim sericea, margine aliquot glandulis parvis munita; petiolus 15–22 mm longus, basi biglandulosus. Inflorescentia in ramis vetustioribus portata, 4–8 cm longa. Pedicellus 6.5–9 mm longus, 0.5–0.8 mm diametro, sessilis. Sepala appressa per anthesin, 4 lateralia 6–8 glandulas ferentia. Petala flava, valde reflexa, inter se similia.

Woody vine, the stems sericeous to glabrate. Lamina of the larger leaves 18–25 cm long, 9–11 cm wide, ovate, elliptical, or obovate, mostly acuminate at the apex, slightly revolute at the margin, cuneate, obtuse, or rounded at the base, initially sericeous but soon glabrescent, with persistent scattered hairs below at maturity, bearing a series of small sessile marginal or very slightly (to 1.5 mm) submarginal glands, often in sinuses, the lateral veins visible above, lateral veins and reticulum prominent or at least visible below; petiole 15–22 mm long, sericeous to glabrate, biglandular at the base, the glands 2 mm in diameter; stipules not found. Inflorescence borne on old, leafless stems, axillary to fallen leaves, 4–8 cm long, sericeous, an open unbranched raceme of stalked or sessile umbels of 2–4 flowers, with some flowers borne singly on the axis, the small bracts (2 mm long) bearing 2 large glands; floriferous bracts and bracteoles ca 0.5 mm long, ovate, sericeous, eglandular, persistent; floriferous peduncle none. Pedicel 6.5–9 mm long, 0.5–0.8 mm in diameter, sericeous. Flower ca 12 mm in diameter. Sepals 1.5 mm long beyond the glands, 1–1.5 mm wide, triangular, appressed in anthesis, abaxially sericeous, adaxially glabrous, the anterior eglandular, the lateral 4 bearing 6–8 glands (4 on the posterior-lateral 2, 1–2 each on the anterior-lateral 2), the glands 1.4–1.7 mm long, circular or elliptical.

Petals yellow, glabrous, all completely reflexed, the lateral 4 with the claw 1.5–1.8 mm long, the limb 3.5–4 mm long, 2.7 mm wide, obovate, erose or denticulate, eglandular, the posterior like the others or the limb slightly wider. Filaments 2.2–2.5 mm long, subequal, connate in the proximal 1 mm, glabrous, those opposite the sepals pressed inward, those opposite the petals leaning outward; anthers 1–1.5 mm long, slightly longer opposite sepals than petals, glabrous, reflexed. Ovary 1.5 mm high, loosely sericeous; styles 2–2.5 mm long, glabrous, strongly divergent, truncate at the apex, stigmatic on the upper-internal angle. Fruit unknown.

TYPE: BRAZIL. Bahia: São José, estrada a Una, Pedra branca, mata, 6 May 1971 fl, *T. S. dos Santos 1603* (CEPEC, holotype; MICH, isotype).

PARATYPE: BRAZIL. Bahia: Uruçuca/Ubaitaba, Apr imm fl, *Santos 761* (CEPEC).

This species is named in honor of Talmon Soares dos Santos, who collected both the type and the paratype. Mr. Santos has made many fine collections in a previously neglected region and thereby contributed much to Brazilian botany.

Heteropterys sanctorum is most similar to *H. transiens* Nied., which seems to be endemic to the area of Rio de Janeiro. They are compared in the characters known for both in the following couplet:

Inflorescence 4–8 cm long, without long lateral branches, borne on old, leafless stems; larger laminae 8–11 cm wide, with all glands nearly or quite marginal; petiole 15–22 mm long.

H. sanctorum.

Inflorescence 15–30 cm long, compound, axillary and terminal on currently leafy stems; larger laminae 11–15 cm wide, bearing a row of glands 5–15 mm inside the margin; petiole 30–50 mm long.

H. transiens.

***Heteropterys marleneae* W. R. Anderson, sp. nov.**

Fig. 8.

Liana lignosa. Lamina foliorum majorum 15–17 cm longa, 7.3–8.5 cm lata; petiolus 13–16 mm longus, 3–4 glandulis immersis munitus. Inflorescentia axillaris, paniculata, 10–20 cm longa, floribus in pseudoracemis 2–6 cm longis, 6–26-floris, tomentoso-velutinis portatis; bracteae 1–1.5 mm longae lataeque, 2 glandulis prominentibus munitae, persistentes; pedunculus nullus vel interdum usque ad 0.5 mm longus; bracteolae bracteis similes sed minores et eglandulosae. Pedicellus 5 mm longus. Sepala apice revoluta.

Woody vine. Lamina of the larger leaves 15–17 cm long, 7.3–8.5 cm wide, elliptical or obovate, obtuse or abruptly short-acuminate at the apex, flat at the margin, rounded at the base, glabrous (at maturity), bearing below in a row on each side 3–4 impressed glands 3–9 mm from the margin, the lateral veins and larger cross-veinlets prominent below, obscure above; petiole 13–16 mm long, tomentose to glabrate, bearing 3–4 glands 1.5–2 mm in diameter, partially immersed in the thick petiole; stipules not seen. Inflorescence an axillary panicle 10–20 cm long, dark brown tomentose-velutinous, simple or compound, with the flowers ultimately borne in pseudoracemes 2–6 cm long containing 6–26 decussate flowers; floriferous bracts 1–1.5 mm long and wide, broadly triangular, bearing 2 prominent glands at the base, abaxially tomentose, persistent; peduncle none or occasionally up to 0.5 mm long; bracteoles like the bracts but smaller and eglandular. Pedicel (in fruit) ca 5 mm long, velutinous with a mixture of short T- and Y-shaped hairs, distally enlarged. Sepals (in fruit) 2.5 mm long, 2 mm wide, triangular, revolute at the apex, abaxially appressed-tomentose, adaxially glabrous, the anterior eglandular, the lateral 4 bearing 8 glands 1.8–2 mm long, elliptical, separated on the sepals. Petals and stamens unknown. Style bearing a short pedaliform apical-dorsal extension. Immature samaras up

to 36 mm long, widely spreading but the wings bent upward beyond the nut, scurfy-tomentose proximally; dorsal wing ca 30 mm long, 10 mm wide, straight or curved; nut 8–10 mm long, 4–5 mm high, without lateral crests or wings.

TYPE: BRAZIL. Amazonas: Lago do Castanho-Mirim, estrada da Petrobrás, mata virgem de terra firme, solo argiloso, humoso, meio úmido, 23 Jun 1973 imm fr, *Albuquerque, Coelho, & Mello 839* (INPA 39180, holotype; MICH, isotype).

Heteropterys marleneae belongs to the natural but difficult subgenus *Parabanisteria*, in which the sepals are always revolute at the apex. It will undoubtedly prove to have yellow petals like the rest of the subgenus. In that group it is unusual in having the short, distally enlarged pedicel sessile or subsessile. It is also notable for its compound inflorescence with dark brown, scurfy, tomentose-velutinous axes, and for the short persistent bracts and bracteoles, the bracts bearing two large glands. This distinctive and interesting species is named in honor of Dr. Marlene Freitas da Silva, Curator of the herbarium at INPA in Manaus. Under her careful supervision that collection has become one of the most important research herbaria in South America.

JANUSIA

All students of the Malpighiaceae have agreed that *Janusia* Adr. Jussieu and *Schwannia* Endlicher are closely related genera. They really differ only in these characters:

Stamens 6 (5 opposite the sepals plus 1 opposite the posterior petal); anthers densely tomentose; stout vines; cleistogamous flowers absent.	<i>Schwannia</i> .
Stamens 5 (opposite the sepals) or fewer; anthers glabrous; slender vines; cleistogamous flowers present in 1 species.	<i>Janusia</i> .

I have now encountered a new species that is perfectly intermediate between the two groups. It is generally very similar to *J. guaranitica* in habit and in possessing cleistogamous flowers, but it has six fertile stamens. Its anthers are sparsely hairy. It is therefore necessary to unite the two genera. The two generic names seem to have been published essentially simultaneously, i.e. both in April 1840 (Stafleu & Cowan, 1976; 1979), and they have never before been considered synonyms, so I must select one of the two names for the genus. I here choose *Janusia* Adr. Juss., for reasons that I shall discuss in some detail in my monograph of the genus. It is also necessary to select a lectotype for *Janusia*, and I here choose *Janusia guaranitica* (St. Hil.) Adr. Juss. Below are published several new combinations that are necessary when *Janusia* and *Schwannia* are combined, and the new intermediate species is described.

Janusia janusioides (Adr. Juss.) W. R. Anderson, comb. nov.
Fimbriaria janusioides Adr. Juss., Ann. Sci. Nat. 2^o Sér. Bot. 13: 250. 1840.

Janusia lindmanii (Skottsberg) W. R. Anderson, comb. nov.
Schwannia lindmani Skottsberg, Kongl. Svenska Vetenskapsakad. Handl. 35(6): 29. 1901.

Janusia malmeana (Nied.) W. R. Anderson, comb. nov.
Schwannia malmeana Nied. in Engler, Pflanzenr. IV. 141: 540. 1928.

Janusia mediterranea (Vell.) W. R. Anderson, comb. nov.
Banisteria mediterranea Vell., Fl. Flum. 191 [text]. 1825 [1829, *fide* Carauta, 1973]; vol. 4 pl. 162 [atlas]. 1831.

This is surely an older name for the species widely known as *Schwannia elegans* (Adr. Juss.) Adr. Juss. Vellozo's description and figure leave little room for doubt as to its identity; note especially these features: six stamens, one style, red ciliate petals with white hairs, elongated white calyx glands, growing in inland thickets. I know of no other member of the Malpighiaceae that this could be.

Janusia schwannioides W. R. Anderson, sp. nov.

Fig. 14.

Planta volubilis, caulibus gracilibus. Lamina foliorum majorum 3–4.4 cm longa, 1.3–2.2 cm lata, elliptica, basi plerumque rotundata, apice rotundata et apiculata, subtus prope basim 2 glandulis disciformibus stipitatis munita; petiolus 6–10 mm longus, eglandulosus. Flores chasmogami in umbellis axillariibus (2–) 3–4-floris portati; pedunculus 8–15 (–21) mm longus, apice vel paulo infra apicem bibracteolatus. Pedicellus 7–16 mm longus. Petala glabra, profunde laciniata, limbo 6–12.5 mm longo, 6–13 mm lato. Stamina 6, subaequalia; filamenta 4.5–6.5 mm longa, 3 sepalis anticis opposita libera, 3 sepalis posticis et petalo postico opposita $\frac{1}{2}$ – $\frac{3}{4}$ connata; antherae 0.8–1.2 mm longae, paucipiliferae. Flores cleistogami 3 carpellis muniti. Samara basi rudimento alarum lateralium munita.

Vine with slender twining stems, forming thickets in shrubs to 3 m high; stems loosely sericeous to velutinous, glabrate in age, with an understory of thinner, shorter white hairs and an overstory of stiffer, longer golden hairs, these varying from strongly appressed to strongly spreading. Lamina of the larger leaves 3–5.2 cm long, 1.3–3 cm wide, elliptical or narrowly elliptical, mostly rounded and apiculate at the apex, slightly revolute at the margin, broadly cuneate or rounded at the base, sericeous above at first but soon glabrescent with some hairs persistent on the midrib, persistently sericeous, appressed-tomentose, or tomentose below, or belatedly glabrescent, bearing at or somewhat above the base below 2 stalked disciform glands 0.25–0.5 mm in diameter with stalks ca 0.3 mm long, the lateral veins and reticulum obscure on both sides; petiole 6–15 mm long, loosely sericeous to glabrate, eglandular, 0.4–0.5 mm in diameter; stipules 0.5–0.7 mm long, triangular, borne on stem at base of petiole. Chasmogamous and cleistogamous flowers both borne in axillary umbels or terminating short lateral shoots, produced simultaneously but mostly not in the same umbels. Chasmogamous flowers borne in umbels of (2–) 3–4 flowers, with a common stalk 5–25 mm long usually bearing 2 bracts or small leaves; floriferous bracts [subtending floriferous peduncles] 1–1.8 mm long, 0.3–0.5 mm wide, narrowly elliptical, membranous, glabrous or bearing a few hairs, eglandular; peduncle 8–15 (–21) mm long, 0.3–0.4 mm in diameter, loosely sericeous to glabrate; bracteoles like the bracts, appressed, usually borne at apex of peduncle, occasionally slightly below. Pedicel 7–16 mm long, loosely sericeous to glabrate except persistently sericeous at the apex, proximally slender like the peduncle but distally enlarged to 1 mm or more in diameter at the apex. Sepals 4–6 mm long, 1.5–2.7 mm wide, elliptical or obovate, rounded at the apex, thin, strongly incurved or inrolled in anthesis, bearing a few straight sessile hairs abaxially, ciliate on the margin at the apex, adaxially glabrous, the anterior eglandular and narrower, the lateral 4 biglandular, the glands green, 1.5–3 mm long, narrowly elliptical. Petals carrot-yellow, glabrous, deeply fimbriate-laciniate (the divisions at least 1 mm long), eglandular; 4 lateral petals widely spreading, with the claw 2.5–3.5 mm long, the limb flat and nearly circular or broadly cuneate at the base, 6–12.5 mm long, 6–13 mm wide; posterior petal with the thick claw erect, 3.3–4.5 mm long, the limb strongly reflexed, circular or obovate, 6–11 mm long, 6.5–12 mm wide. Stamens 6 (5 opposite the sepals plus 1 opposite the posterior petal), all fertile, subequal; filaments 5–6.5 mm long opposite sepals, 4.5–5.3 mm

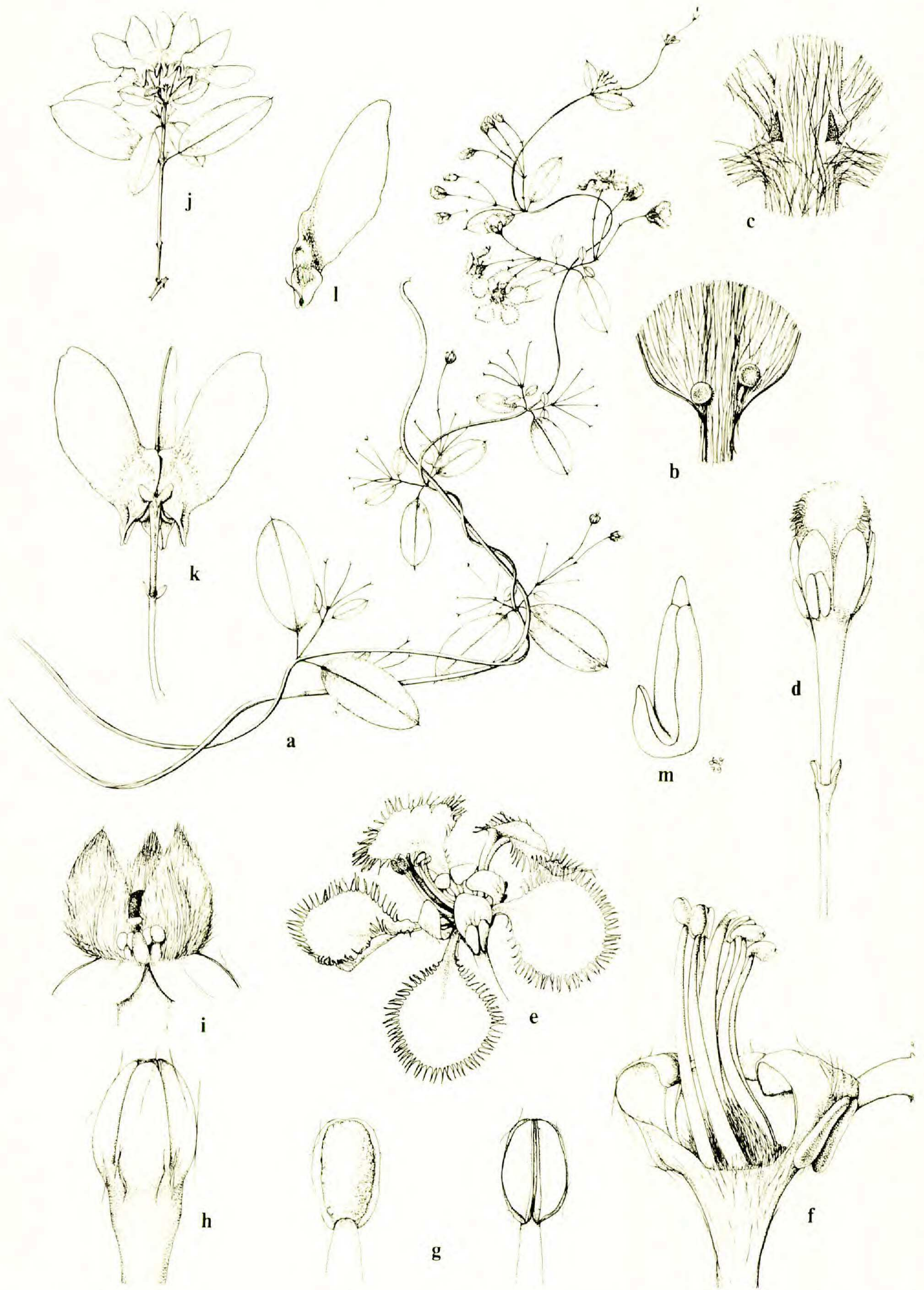


FIG. 14. *Janusia schwannioides*. a) habit, $\times 0.5$; b) base of lamina, abaxial side, to show hairs and glands, $\times 10$; c) stipules, $\times 10$; d) bud of chasmogamous flower, $\times 3$; e) chasmogamous flower, $\times 2.5$; f) androecium and gynoecium of chasmogamous flower, with anterior sepal to left and claw of posterior petal to right, 1 anterior-lateral sepal removed, $\times 5$; g) anthers of chasmogamous flower, abaxial view (left) and adaxial view (right), $\times 15$; h) cleistogamous flower, $\times 10$; i) cleistogamous flower with samaras enlarging and sepals pulled back to show rudimentary petal, 2 stamens, and style, $\times 10$; j) infructescence, with fruits all from cleistogamous flowers, $\times 0.5$; k) fruit from a single cleistogamous flower, $\times 1.5$; l) samara, $\times 1.5$; m) embryo, $\times 5$. Drawn by Karin Douthit from the type.

long opposite posterior petal, glabrous, the anterior 3 free, the posterior 3 one-half to three-fourths connate, all crowded around the style and curved downward toward the anterior sepal and then upward; anthers 0.8–1.2 mm long, alike, often reflexed, bearing a few appressed hairs on sides of locules and sometimes a tuft of longer, twisted hairs at apex or base. Carpels 1–1.5 mm high, borne on a low common receptacle, densely sericeous; style 1, borne on the anterior carpel, 5–6.5 mm long, glabrous, stout, lying in plane of symmetry of flower, curved downward toward anterior sepal and then abruptly upward at the apex, the terminal stigma often slightly oblique, extending just beyond the anthers. Cleistogamous flowers borne singly or, usually, in umbels of 2–4 flowers, with a common stalk 1–5 mm long; bracts and bracteoles like those of chasmogamous flowers but mostly shorter; peduncle 2–8 mm long; cleistogamous flowers occasionally replacing 2 of the 4 flowers in a chasmogamous umbel. Pedicel 3–8 mm long. Sepals 1.5 mm long, 0.7 mm wide, eglandular, appressed, narrowly elliptical, abaxially sparsely sericeous, adaxially glabrous. Rudimentary petals 1–5, 0.1–0.4 mm long, non-vascularized, concealed between bases of sepals. Stamens 2, opposite posterior-lateral sepals, with filaments 0.15–0.2 mm long and anthers 0.25–0.3 mm long, indehiscent. Gynoecium with all 3 carpels developed and fertile; style 1, borne on the anterior carpel, ca 1 mm long, hook-shaped, bent over between posterior carpels to bring stigma into contact with anthers. Fruit, whether derived from chasmogamous or cleistogamous flowers, comprising 3 samaras, or fewer through failure of 1 or 2 carpels to mature; samaras separating from a low, rounded or obscurely 3-sided torus 1 mm or less high; samara 18–20 mm long, loosely sericeous proximally; dorsal wing 12–15 mm long, 5.5–7 mm wide, with a rounded projection 1–2 mm high at the adaxial base; nut ca 2 mm high, 4 mm long, laterally flattened; lateral wings restricted to base of nut, partially to completely connate, forming an apparent flattened extension of the nut 2–3 mm long and wide at right angles to dorsal wing; cartilaginous carpophore well developed and functional, extending from receptacle down line of fusion of lateral wings. Embryo with the cotyledons subequal, flattened, folded back in the distal third.

TYPE: BRAZIL. Bahia: Trail from Lagoinha (which is 5 km SW of Delfino) to Minas do Mimoso (41°16' W, 10°27' S), elev 640 m, caatinga 1.5 km NW of Lagoinha, 7 Mar 1976 fl/fr, *Anderson 11748* (MBM, holotype; K, MICH, NY, RB, isotypes).

PARATYPES: BRAZIL. Bahia, Mun. Poçoões: 2.5 km W of Poçoões on road to Bom Jesus da Serra, dense roadside brush, Mar fl/fr, *Anderson 12514* (MICH, RFA); Km 10 da estrada que liga Poçoões (BR-116) ao povoado de Bom Jesus da Serra (ao W de Poçoões), transição entre Mata de Cipó e Caatinga, 750 m, Mar fl/imm fr, *Mori et al. 9517* (CEPEC, MICH).

Janusia schwannioides resembles *J. guaranitica* in its habit, inflorescence, samaras, and production of cleistogamous flowers, but in the latter species the petals are subentire, there are only five stamens, the stamens and style are \pm erect and straight, and the cleistogamous flowers have only two carpels. The other species that resembles *J. schwannioides* is *J. janusioides sensu stricto*. It has shorter petioles, floriferous peduncles very short or absent, smaller flowers with the less deeply lacinate petals hairy adaxially on the claw, shorter, less curved androecium and gynoecium, and hairier anthers; it does not produce cleistogamous flowers.

MASCAGNIA

In the last volume of these Contributions (Anderson, 1980), I pointed out that *Banisteria riedeliana* Regel was an older name for *Mascagnia metallicolor*

Nieden zu, and made the appropriate new combination. Recently, while studying in Paris the types of species described by Adrien de Jussieu, I discovered that there are two still older names for this species. The new combination and a full synonymy for this species as I now understand it are given below. See the 1980 paper for a description and illustration of the species.

- Mascagnia renidens** (Adr. Jussieu) W. R. Anderson, comb. nov.
Hiraea renidens Adr. Jussieu, Ann. Sci. Nat. 2° Sér. Bot. 13: 26. 1840.
Hiraea heteropetala Adr. Jussieu, Arch. Mus. Hist. Nat. 3: 557–558. 1843.
Banisteria riedeliana Regel, Ind. Sem. Hort. Bot. Petropol. 17. 1855.
Tetrapterys renidens (Adr. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 88. 1858.
Tetrapterys heteropetala (Adr. Jussieu) Grisebach in Martius, Fl. Bras. 12(1): 88. 1858.
Mascagnia metallicolor Niedenzu, Arb. Bot. Inst. Lyc. 3: 20. 1908.
Mascagnia riedeliana (Regel) W. R. Anderson, Contr. Univ. Mich. Herb. 14: 21. 1980.

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LITERATURE CITED

- Anderson, William R. 1980. Notes on *Mascagnia* in South America. Contr. Univ. Mich. Herb. 14: 17–23.
 ———. 1981. Malpighiaceae in The botany of the Guayana Highland—Part XI. Mem. New York Bot. Gard. 32: 21–305.
 Carauta, J. P. P. 1973. The text of Vellozo's Flora Fluminensis and its effective date of publication. Taxon 22: 281–284.
 Niedenzu, Franz. 1928. Malpighiaceae in A. Engler. Das Pflanzenreich IV. 141: 1–870.
 Sandwith, N. Y. 1935. Review of the species of *Byrsonima* occurring in British Guiana. Kew Bull. 1935: 311–316.
 Stafleu, Frans A., & Richard S. Cowan. 1976. Taxonomic literature, second edition. Vol. I: A–G.
 ———. 1979. Taxonomic literature, second edition. Vol. II: H–L.e.